

MAGAZINE
OF
ZOOLOGY AND BOTANY.

ORIGINAL COMMUNICATIONS.

I.—*Notices of British Fungi.* By Rev. M. J. BERKELEY, M. A.,
F. L. S. (*Continued from page 42.*)

No. II.

38. *Agaricus hæmatophyllus*, n. s. Berk. Brit. Fung. Fasc. 3, ined.—On peat earth abundantly, in a north border, and amongst rock-work (in company with *Ag. cristatus*;) more sparingly and smaller in a hot-house, where it sometimes sprang from the wall itself, at Milton, Northamptonshire, where it was pointed out to me by Mr J. Henderson, at the beginning of October last. The same gentleman has since found it growing amongst loam in melon pits, and a single specimen has occurred to myself at Lambley Notts on a steep declivity, on loamy clay. The nearest affinity of this curious species, which belongs to the subgenus *Lepiota*, is with *Ag. cristatus* and *Ag. meleagris*, from which it differs essentially in colour, and in its approximate gills.

Solitary, or gregarious; often fasciculate. Pileus $1-1\frac{1}{2}$ inch broad, thin, brittle, chocolate or olive-brown, clothed with minute raised scales, and copious meal of the same colour; flesh pale, not changing when cut. Gills varying greatly in breadth, rounded behind, quite free, but approximate, at first of a fine red like that of the gills of the best mushrooms, at length deep chocolate. Ring broad, fugacious, attached at first in ragged triangular laciniae to the edge of the pileus, mealy externally like the pileus, of a beautiful pink within. Stem $1\frac{1}{2}$ inch high, 1-2 lines or more thick, chocolate

red when rubbed, but clothed with meal, red within, stuffed with white silky filaments, penetrating into the soil by means of a few white branched fibres ; smell strong, like that of *Ag. cristatus*. The meal, under a strong magnifier, consists of globular vesicles, which are sometimes shortly pedicellate.

Tab. XV. Fig. 1. *a. a.* *A. hæmatophyllus** nat. size ; *b. b.* vertical section ; *c.* meal highly magnified.

39. *Ag. erubescens*, Fr. Syst. Myc. vol. i. p. 32.—Amongst beech leaves in a wood near King's Cliffe, Oct. 7, 1836. *Ag. carnosus*, Curt. Sow., formerly referred by Fries to this species, is now considered by him *Ag. maculatus*, Alb. and Schw. At the time the English Flora was published I had not met with it, but a single specimen which occurred lately in one of the larch plantations in Sherwood Forest was sufficient to show that it was at least not a true *Limacium*, though I am not satisfied that it is so nearly related to *Ag. fusipes* as Fries (El. i. p. 17,) supposes. The present autumn has also furnished me with a sample of the real *Ag. erubescens* ; and though, in some respects, similar to *Ag. carnosus*, it is at once distinguishable by its more robust habit, but especially by its possessing the characters of the subgenus *Limacium*.

Pileus $2\frac{1}{2}$ inches broad, plano-convex, fleshy, compact, white tinged with rufous, slightly viscid ; margin downy involute. Gills rounded behind, adnexed, rather distant. Stem 2-3 inches high, $\frac{3}{4}$ inch thick, curved at the base, thickest above, stout, firm, fleshy, mottled, within squamuloso-fibrillose ; subglanduloso-squamulose within the pileus, which it resembles in colour. Smell scarcely any.

* 40. *Ag. cossus*, Sow. t. 121.—The difficulties respecting this species are stated in the English Flora. Having lately found *Ag. nitens*, Sow., which is also a true *Limacium*, I am enabled to state positively that it is quite distinct from the present species. Though exactly resembling *Ag. cossus* in outward form, it is quite destitute of its disagreeable smell ; and when dried, the white turns to a dark foxy brown, as indeed is represented in Sowerby's plate. It still remains to be proved whether *Ag. eburneus* of continental authors be the same with Sowerby's *Ag. nitens*. I can find no account of such a marked change of colour taking place.

* 41. *Ag. fusco-purpureus*, Pers. Ic. et Descr. t. 4. f. 1-3.—The

* The specimens from which the figures were taken were scarcely so dark as the usual state of the species, in consequence of having been slightly touched by frost.

description of this species in the English Flora is by some mischance mixed up with that of *Ag. pelianthinus*. Both will soon be given in the Fasciculi of British Fungi.

42. *Ag. balaninus*, n. s.—On beechmast, Sept. 1836, King's Cliffe, Northamptonshire. An exquisite species, belonging to the section *Calodontes* of the subgenus *Clitocybe*, agreeing in many respects with *Ag. marginellus*, which appears to have been met with by Persoon only, and that perhaps not subsequently to the publication of his Synopsis. That plant is, however, very much smaller, and grows on fir-trees.

Pileus $1\frac{1}{2}$ inch broad, convex subcampanulate, obtusely umbonate, at length more or less expanded, ochraceous with a slight tinge of amber, very minutely mealy, slightly rugulose carnosomembranaceous; margin scarcely striate. Gills broad, rounded, quite free, with the exception of a connecting tooth, rather distant, pale, sprinkled and fringed with dull purple spiculæ; interstices veiny. Sporidia white, elliptic. Stem $2\frac{1}{2}$ inches high, 1-2 lines thick, attenuated downward, flexuous, rigid, white, and mealy within the pileus, deep Sienna brown below, dark brown at the base, which is imbedded more or less in a spongy mass, by which it adheres to the mast, shining, quite smooth, fistulose.

Tab. XV. Fig. 2. *a.* *Ag. balaninus*, nat. size; *b. b. b.* vertical section; *c.* a section of the extremity of a gill highly magnified to show the spiculæ; *d.* sporidia highly magnified.

* 43. *Ag. undatus*, Berk. Eng. Fl. Vol. v. pt. 2, p. 51. Brit. Fung. n. 9.—The habitat of this species, as given in the English Flora, is small stumps and sticks. I now find the species very frequently in one locality, and there always upon the subterraneous base of decayed stems of *Pteris aquilina*.

* 44. *Ag. tuberosus*, Bull. t. 256.—Frequent opportunities of examining this species, under various circumstances, have convinced me that *Acrosperrum cornutum* is not an autonomous fungus, contrary to the opinion entertained by me in the English Flora, but a mere disguised form of the plant. When growing on the gills of *Agaricus adustus*, it commences by a little white downy elongated granule, which gradually increases in length and breadth, becoming brown and quite smooth, resembling much the bulb of some species of *Oxalis*, and either gives origin at the apex to a stem and pileus, or suddenly stops in its growth without producing either, and remains dormant through the winter. In the first case, the stem of the Agaric is perfectly continuous with the tuber, as represented correctly, though rudely, by Bolton; occasionally, indeed, the tuber

is so little developed as to be nothing more than a slight incrassation of the base of the stem. In the second case, the perfect fungus is not developed till the ensuing year, when a crop springs up from the tubers, which are in general buried by fallen leaves or moss. The Agaric then springs indifferently from the apex, or any other part of the tuber, and occasionally more than one pileus is produced. It is to be observed that this Agaric often grows upon real Sclerotia, as it does upon other fungi; and the tuberiform state is merely to be regarded as a form arising probably from excess of nourishment. While on this subject it may not be amiss to state that the tubers of *Typhula phacorrhiza* and *gyrans* are true Sclerotia. The former I find on *Sclerotium complanatum* and *scutellatum*, the latter upon *Sclerotium semen*.

* 45. *Ag. racemosus*, Pers. Disp. Meth. Fung. t. 3. f. 8. Sow. t. 287.—King's Cliffe, Northamptonshire. Respecting this most singular production I have stated in the English Flora, in conformity indeed with a notion expressed by Fries, that I suspect it to be a monstrous state of the foregoing, which has frequently a branched stem. Having lately had the good fortune to meet with a few specimens, I am satisfied that it is distinct, as it turns almost black in drying. My specimens have not the pileus developed, and if it had not been for its being figured in that state, I should without hesitation have considered it a branched *stilbum*, so completely has it the characters of that genus, the little heads being hyaline gelatinous, and consisting of minute elliptic granules.

* 46. *Ag. vulgaris*, Pers. Tent. Disp. Meth. p. 25. Ic. Pict. t. 19, f. 3. Fr. Syst. Myc. V. i. p. 156.—On fir leaves, Sherwood Forest, October 1836. This species, it should be observed, is included in London's list given in the Hortus Britannicus.

* 47. *Ag. pterigenus*, Fr. Syst. Myc. V. i. p. 160.—The fungus described under this name in the English Flora is, as stated there, only a variety. The true plant, than which nothing can be more elegant, occurred in tolerable abundance in October last at Lambley, Notts, on dead stems of *Aspidium filix mas*. The colour varies in different individuals from bright orange-red to rose-colour, occasionally the upper part of the stem is brown. The gills are ornamented with a bright orange margin. The pileus in the young plant is oblong, oval, obtuse, minutely furfuraceous at the apex, marked with darker slightly anastomosing veins, which at length, in consequence of the quicker growth of the subjacent stratum, and the collection of the veins themselves into bundles radiating from

the centre, form striæ on the pileus. The stem under a high magnifier is often streaked with veins like the pileus.

* 48. *Ag. mitis*, Pers. Syn. p. 481.—Abundantly on branches of larch, lying on the ground in Sherwood Forest, October 1836. Upper stratum gelatinous.

49. *Ag. cyphelliformis*, n. s.—On the lower part of a dead plant of *Pentstemon ovatum*. Milton, Northamptonshire, October 1836. Apparently closely allied to no described species. Gregarious. Pileus 2 lines or more broad and high, altogether stemless, cup-shaped, hanging down, cinereous, very minutely strigose, especially at the base; margin paler, sprinkled with a few meal-like scales. Upper stratum gelatinous cinereous, beneath which the flesh is white and very thin. Gills pure white, rather distant, the alternate ones shorter, narrow, linear.

Tab. XV. Fig. 3. *a.* *Ag. cyphelliformis*, nat. size; *b. b.* do. magnified; *c.* a section, also magnified.

* 49. *Ag. cinnamomeus. d. croceus*, Fr. Syst. Myc. V. i. p. 229.—In a beech wood, King's Cliffe. The figure of Batsch *A. squamulosus*, f. 117, exactly represents my plant, which belongs to a variety apparently not before observed in this country.

50. *Thelephora spadicea*, Fr. El. V. i. p. 176.—On oak stumps, not uncommon in Northamptonshire. Easily known from every state of *Thel. purpurea* by its becoming blood-stained when scratched. I suspect that Sowerby had this species in his eye when illustrating his *Auricularia tabacina*, if indeed his plant be not altogether identical with it. Sporidia copious, pure white, oblong-elliptic.

* 51. *Phlebia vaga*, Fr. Syst. Myc. V. i. p. 428. El. i. p. 155.—On a decaying fallen branch, King's Cliffe. It is also noted as British by Loudon. Nothing can be more exact than the description given by Fries in his *Elenchus*.

52. *Clavaria juncea*, Fr. var. β *vivipara*, Fr. Syst. Myc. V. i. p. 479. *A. fistulosa*, Bull. t. 463, H.—Amongst oak leaves, King's Cliffe. My plant is precisely what is figured by Bulliard, but I cannot help suspecting that it is an unusually luxuriant form of *Typhula phacorrhiza*.

53. *Sclerotium truncorum*, Fr. Syst. Myc. V. ii. p. 252.—In various places in Northamptonshire, amongst moss on old stumps, generally forming the matrix of *Ag. tuberosus*.

54. *Sphæria cornicola*, Fr. Syst. Myc. p. 530.—On leaves of *Cornus sanguinea*, King's Cliffe.

55. *Asteroma veronica*, Desm. n. 778. cum icone.—On leaves of

Veronica officinalis, King's Cliffe. The analysis given by Desmazière exactly accords with my own observations.

57. *Sphæronema blepharistoma*, n. s. Berk. Brit. Fung. Fasc. 3. ined.—On the blackened gills of *Ag. adustus* in very wet weather, King's Cliffe, September 1836. This species is not only in itself extremely well marked, though at first easily regarded as a depauperated state of *Sphæronema subulatum*, but it is especially interesting on account of its peculiar characters, which throw light upon the real structure of that species. Dr Greville remarks, that in *Sph. subulatum*, the perithecium, previous to maturity, contains the sporidia mixed with a gelatinous pulp and a few filaments, which being evacuated along with the sporidia, were very obvious in several specimens he dissected. That the filaments, however, are not discharged with the other contents of the perithecia, I have completely satisfied myself, by induction first, and then by ocular demonstration, but that they originate on the outer surface of their tips, and are in fact the free apices of the flocci, of which the perithecia are composed. This appears very clearly to be the case on comparison with the species represented in the accompanying plate, in which the perithecium is made up of a single circle of filaments, whose bases are soldered together, and whose free apices form a beautifully ciliated orifice; whereas in *Sphæronema subulatum*, there being many circles of filaments, the orifice is furnished with a pencil-like tuft of filaments. In this case, however, if I mistake not, the orifice itself is not ciliated as represented in the figure; at least I have not seen it so. The filamentous structure of the perithecium in *S. blepharistoma* is easily traced almost to the base; in *S. subulatum* the filaments in each circle being more numerous and finer, and the perithecium not made up of a single circle, the substance is much thicker and denser, and its filamentous structure more obscure. Indeed, had it not been for the discovery of the present species, I should have still regarded the filaments as rejected from the perithecium, though with a degree of uncertainty about the matter, such as is intimated in my observation on the species in the English Flora. It is to be observed, that the structure of either is scarcely to be ascertained with accuracy, except from fresh specimens. *S. blepharistoma* at present has occurred only on *Agaricus adustus*; *S. subulatum* is found on various *Agarics* and *Boleti*. A question may be raised whether fungi so constructed belong properly to the division *Pyrenomycetes*; as the texture of the species before us, at least, is not strictly speaking vesiculoso-floccose. When, however, the uterine character is taken into account, and the visible advance toward the

more normal structure so immediate in *S. subulatum*, I think there can be no reasonable doubt about it. Were, however, the filaments but free to the base in *S. blepharistoma*, and by consequence the mass of sporidia collected in a globule at their centre, we should have a fungus belonging to the Coniomycetes, and indeed only specifically distinct from *Psonia rosea* and *hyacinthorum*, Berk. Whether the structure in other species of *Sphaeronema* is at all the same, I have no means of ascertaining, as I have never met with any in a recent state.

Perithecia scarcely exceeding half a line in height, often much more minute, transparent, of a very pale yellow, varying greatly in form, but in general more or less inflated at the base, occasionally conico-subulate, often confluent, mostly furnished with a long distinct slender neck, the orifice of which is fringed with a single row of distinct filaments, which are indeed the apices of those of which the perithecium is composed. Sporidia oblong, obtuse or subtruncate, much larger than in *Sp. subulatum*, flowing out and forming about an elongated subsistent pale-yellow globule.

Tab. XV. Fig. 4. *a.* portion of gill of *Ag. adustus*, with *S. blepharistoma*, nat. size; *b.* do magnified; *c.* single perithecium; *d.* orifice and sporidia; *e.* orifice and sporidia of *S. subulatum*, all highly magnified.

* 58. *Phacidium coronatum*, Fr. Obs. i. p. 167.—This species has been often figured, but I cannot find anywhere an accurate analysis. The figures of Ditmar and Dr Greville are both defective from two low a magnifier having been used. Dr Greville, indeed, only indicates the presence of paraphyses, and figures a very few minute elliptic sporidia in the asci. In Ditmar's figure the paraphyses are distinctly drawn, and the sporidia are more numerous. The latter even under a low power is the more correct; with a magnifying power a little superior, the sporidia appear to be distributed in short lines, and the paraphyses flexuous; but when highly magnified the granules are found to be sporidiola, arranged six or seven together in linear sporidia, and the paraphyses curled round at the tips, like the apices of the filaments in *Helicosporium*, but not as in that genus septate. It is probable that a still higher power might show septa between the sporidiola. I find the structure precisely the same, whether the plant is produced on beech or oak leaves, and in specimens that have been dried for the herbarium.

Tab. XV. Fig. 5. *a.* asci and paraphyses of *Phacidium coronatum*; *b.* sporidium, both highly magnified.

II.—*The Natural History of the British Entomostraca.* By WILLIAM BAIRD, Surgeon, H. C. S. Plate XVI. (Continued from p. 333.)

IN my last paper (No. 4 of Magazine of Zoology and Botany) I gave a monograph of all the British species of *Cyclops*, that I have been able as yet to discover in the fresh water and sea shores of this country, without, however, pretending to have made the list complete.* I shall now proceed to take notice of two other genera, the history of which is also replete with interest,—the genera *Cypris* and *Cythere*.

In Latreille's arrangement they form the 2d group of his section *Lophyropa*, the *Ostracoda*. In M. Edwards' work they will form the 1st order of his Legion *Entomostraces*, the *Ostrapodes*. M. Straus, previous to M. Edwards, had removed these two genera from the *Branchiopodes*, and formed them into a distinct order by themselves, which he has also named *Ostrapodes*. As we may have some remarks to make upon the systematic arrangement of the insects belonging to the *Entomostraca* at the close of these papers, we shall defer till then giving the reasons why the genera *Cypris* and *Cythere* should be removed from the *Branchiopodes*, and in the meantime, in accordance with what I have already stated upon this subject in my former paper, I shall follow Latreille's arrangement with them as well as with the *Cyclops*.

Order, BRANCHIOPODA,—Section, LOPHYROPA,

Group, OSTRACODA,—Genus, I. CYPRIS, II. CYTHERE.

1st Genus, CYPRIS.

Bibliographical History.—Baker is said to be the first author who has taken any notice of this genus. In his work "Employment for the Microscope," published in 1753, an anonymous correspondent describes at some length an insect which has a bivalve shell, somewhat resembling a small fresh-water muscle, and gives a figure of it lying on its back, which is barely sufficient to enable us to discover that it is a *Cypris*. Straus complains that he cannot discover any mention made of the genus by Baker, either in the edition of 1743, or 1744, which are the only editions he has been able to see; neither is there, he says, any plate 15 in either of these editions. He quotes the wrong work, however, having referred to the "Microscope made easy," instead of Baker's second work "Employment for the Microscope," in which he would have found the insect referred

* Dr Macculloch, in his work on the Highlands and Islands of Scotland, says—he has added 33 new species!

to by Muller. Linnæus in his *Fauna Suecica*, 1746, describes a species in a few general terms; and in the 7th edition of his *Systema Naturæ*, 1748, he mentions a species under the name of *Monoculus concha pedata*, but gives no description. In the 10th edition of the same work, edited by Langius, 1760, he gives the description as taken from the *Fauna Suecica*, but names it *Monoculus conchaceus*. Joblot, in his "Observations d'Histoire Naturelle faites avec le Microscope" 1754, describes a species which he calls *poisson nommé Detouche*, or *grain de millet*, from its resemblance in size and colour to that species of seed, and gives a figure of it. Ledermuller, in his work on the microscope, "Mikroskopischer Gemüths und augen-ergotzung, &c." 1760, gives several figures of a species of *Cypris*, and says he has frequently seen them in copulation. Poda, in his "Insecta Musæi Græcensis," 1761, gives one species, the *Monoc. conchaceus* of Linnæus, quoting merely his description. Geoffroy, in his "Histoire des Insectes," 1762, after a few general remarks upon the *Monoculi*, describes shortly two species of this genus, but gives no figures of them. Muller, in his "Fauna Insectorum Fridrichsdalina," 1764, only mentions one species, under the name and description given by Linnæus in his "Fauna Suecica," but in 1771 he published an admirable paper in the "Philosophical Transactions," attributed by M. Straus to Mr Bennet; but only communicated to the Royal Society through him, in which he gives an excellent account of two species in particular, with many details of their anatomy and habits, and concludes by giving a list of nine species which he had at that time discovered; he includes them all, however, under the name of *Monoculus*. In his "Zoologiæ Danicæ prodromus," 1776, he first established the genus *Cypris*, as well as the other genera of his Entomostraca, all of which till then had been constantly described under the general name of *Monoculus*. Fabricius in his "Systema Entomologiæ" 1775, gives the species which Linnæus had already described, the *Monoc. conchaceus*; and De Geer, in his "Memoires pour servir à l'Histoire des Insectes," 1778, describes one or two species, though he calls them only varieties of the same, and gives a few details concerning them. In 1785 appeared the "Entomostraca" of Muller, with copious details and descriptions, and pretty accurate figures of all the species already shortly described by him in his "Zoolog. Dan. prodrom." and at the end of his paper in the Philosoph. Trans., which paper is also reprinted in French, at the commencement of this excellent work. Till the time that Muller undertook the working out of the species of this genus, our knowledge of them was scanty indeed. The descriptions found in the

authors I have already quoted previous to him, were so superficial, that even when illustrated by figures, which are also generally very bad, there was no possibility of distinguishing what species they meant to describe. This difficulty may be readily seen upon inspecting the synonymes given by Muller, and then referring to the authors quoted by him, when we can easily observe that he himself has made several mistakes in such references, neither the description nor figures of such agreeing with his. For instance, under the species *pubera*, he refers to the *M. conchaceus* of Linnæus, with the description which that author gives in his *Fauna Suecica*, "antennis capillaceis, multiplicibus, testa bivalvi,"—a description so very general, that it answers equally well to any or all of his eleven species. He also refers to Joblot for the same species, but from the figure which that author gives, as well as from his description, it appears to me, that it much more nearly resembles Muller's *Candida*, and the reference to De Geer is equally faulty, as it is evident that figure 5 and figures 6, 7 of that author, *both* of which are quoted by Muller as the *pubera*, are in reality *two* distinct species! In determining the species, therefore, we must consider the researches of the various authors previous to Muller as of little or no use whatever. Indeed after Muller's time the various authors who have taken notice of this genus of insects have done little else but copy him, till the appearance of Straus's paper and the work of Jurine. For instance, Gmelin in the 13th edition of the "Systema Naturæ," 1788, not only quoted Muller's species, but gives his faulty references also; and Manuel, in his article "Monocli," in the "Encyclopédie Methodique, Histoire Naturelle, Vol. 7th," 1792, after a few general details, copies the same species as Gmelin gives; while Fabricius in his "Entomologia Systematica," 1793, gives the 11 species which Muller gives, retaining in addition to this, Gmelin's erroneous quotations. Bosc, in his "Histoire Naturelle des Crustacés faisant suite à l'édition de Buffon, publié par Deterville," 1802, gives a great many interesting details of this genus; as does also Latreille in his "Histoire Naturelle Générale et Particulière des Crustacées et Insectes, faisant suite à l'édition de Buffon, publié par Sonnini," 1802; but he only mentions Muller's species. Ramdohr in 1805 published his little work on the *Monoculi*,* in which he gives some very excellent details concerning the anatomy of the *Cypris*, accompanied by some very good figures, but his work does not seem to have been known to almost any of the succeeding na-

* Beytrage zur Naturgeschichte einigen deutschen *Monoculus* arten.

turalists who have written upon this genus; he only describes the *Cypris strigata* of Muller. M. Daubebart de Ferussac, fils, in a memoir published in the "Annales du Museum d'Histoire Naturelle, Tom. 7th," 1806, describes a new species; and M. Risso, in his "Histoire Naturelle des Crustacés des Environs de Nice," 1816, describes two additional ones; but though these additions were made to the number of known species, and although Latreille, in Cuvier's "Règne Animal," 1817, and Lamarck, in his "Hist. Nat. des Animaux sans Vertébres," 1818, give a variety of details concerning the genus generally, little real knowledge concerning the anatomy of the inhabitants of the tiny shells was conveyed to us, as Ramdohr's work seems to have attracted no attention, till M. Straus published his admirable paper on the genus *Cypris* in the 7th Vol. of the "Mémoires du Museum d'Histoire Naturelle," 1821, containing a most elaborate anatomical description of the genus, with a notice and figures of three new species not described by Muller. About the same period as Straus read his paper before the Academy, appeared Jurine's splendid work on the *Monoculi*, containing many very interesting details of this genus generally, with beautiful figures of 18 species; but both of these authors appear to have been ignorant of the previous work of Ramdohr, as we find no reference made by either of them to his excellent little work, though published fifteen years prior to theirs. Desmarest in his "Considerations Générales sur les Crustacés," 1825, although he gives a very good account of the different genera, taken chiefly from Straus and Jurine, with a description of 21 species, takes no notice of Ramdohr; though M. Latreille, in the last edition of the "Règne Animal," 1829, notices his memoir with all due approbation, and has contributed much to make his labours more generally known. We know of no original memoir upon this genus having been published in this country,—though in "Rees' Cyclopaedia," under the Art. *Monoculus*, we have the species described as given by Fabricius; and in Leach's article *Crustacea* in the "Edinburgh Encyclopedia," we have no details, and only two or three species taken notice of.

ANATOMY.—Muller, Ramdohr, Jurine and Straus, all differ in many respects in describing the anatomy of the genus *Cypris*, both as regards the nomenclature and the use of the parts described by them. In minuteness of detail and accuracy of description and figures, the memoir of Straus, however, stands pre-eminent amongst those of his fellow-labourers, and though in the following remarks we shall take all advantage of the memoirs of the other three authors, we shall follow M. Straus more particularly, in his nomen-

clature and descriptions. The body of the animal is completely inclosed within a horny shell of two valves, which in general appearance resembles very considerably that of the mussel,—so much so, that, as Muller says, a person at first sight of the insect, would suppose that it was a parasite inhabiting the shell of some small mollusque. The substance of these valves is compact and very brittle, and they seem to be endued externally with a species of varnish, to protect them from the action of the water, as, whenever they rise to the surface, the shell becomes perfectly dry and floats there in spite of the animal's struggles to again immerse itself. The valves are open in their whole circumference, except in the middle third of the dorsal surface, where they are united by a ligamentous hinge and muscles, by which the animal can open and shut the shell at pleasure. About the middle of each valve, in most species, are to be seen a number of small lucid spots, the use of which I do not know. Muller has taken notice of them in the *pubera*, and asks, “an ovula?” but there is no connection between them and the ova. No other author has taken notice of them; they are to be met with in perhaps all the species.

The body of the insect (Plate XVI. Fig. 1,) is composed of two rounded lobes of unequal size, connected together by a narrow space, and having on their upper surface a transparent body, which is the matrix according to Jurine. From the anterior lobe of the body (Fig. 1, *a*,) spring the two antennæ, immediately above which is situate the eye; the anterior or first pair of feet; the organs of the mouth, and the second pair of feet. From the posterior lobe, (Fig. 1. *b*) spring the third pair of feet and the tail. Eye (Fig. 1. *c*) single, fixed, in the form of a black sessile tubercle, in which we can discover no traces of crystallines. Antennæ (Fig. 1, *d*. Fig. 2,) two, inserted immediately below the eye, and rising near each other. In general they consist of seven articulations, * from the three or four terminating ones of which arise several pretty long filaments, varying in number in the different species. In the larger species we see these filaments to be beautifully plumose, a circumstance which has never been pointed out by any of the various authors who have written upon this genus. Whenever the animal moves, it invariably puts these organs into rapid motion, dilating and bringing together again the long filaments which spring from near their extremity, and waving them to and fro with great rapidity. They are thus said by Muller and Straus to act as true fins, and to be the principal organs of

* Jurine says 8.

progressive motion which the insect possesses ; and no doubt the plumose nature of the filaments assists materially their power, though Jurine says that, from their position in the anterior part of the body, and from their motions being thus confined by the opening of the shell, they cannot be considered as acting the part of true fins ; and that their use in progressive motion is much inferior to that of the anterior pair of feet. Latreille thinks these filaments may also act as respiratory organs as well as the branchial plates of the jaw. There is very considerable discrepancy amongst the four authors I have above mentioned, as to the number of feet. Muller and Ramdohr say there are only four ; the former remarking upon the singularity of an insect quadruped. Straus enumerates six, while Jurine says there are eight. Muller was not aware of the organs which Straus calls the third pair of feet ; Ramdohr was, but considers them as connected with the male organs of generation, while Jurine says that they are organs arising from the matrix, the use of which he does not understand. In addition to the first and second pairs, of Muller, Ramdohr, and Straus, Jurine considers the organs which Muller calls “ barbillons” attached to the mouth, (the palpi of the mandibles of Straus) and the branchial plate of the upper jaw, as two additional pairs of feet. In describing these parts of the body, I shall follow Straus’s nomenclature, as appearing to me the simplest and best, and certainly the most accurate ; the figure which Jurine gives of them not being at all correct. Feet, then, are six in number, or three pairs. The first or anterior pair (Fig. 1. c. c. Fig. 2.) are inserted immediately beneath the antennæ, are the strongest of all, and consist of five articulations.* The penultimate one, or “ jambe” of Straus, gives origin near to its base to several pretty long filaments, varying in number and length in different species ; and like those of the antennæ, in the larger species, are seen to be beautifully plumose, a fact not taken notice of by any author, and the last articulation, the tarsus of Straus, is terminated by three pretty strong hooks. This pair of feet therefore, by this organization, is fitted for both swimming and walking ; the long plumose filaments of the fore leg answering the same purpose, and being applied to the same use as those of the antennæ, causing these feet when put in motion to act also as fins, while the hooks at the termination of the tarsus enable it to seize hold of the plants, &c. amongst which they live, and thus walk from place to place. These feet are considered by Jurine as more deserving the name of fins than the an-

* Jurine says eight.

tennæ are, but yet he does not mention the long filaments which they possess, and by which their action, as fins, is principally produced. They are considered by Latreille as acting, along with the antennæ, as respiratory organs. The second pair of feet (Fig. 1. *f.* Fig. 4.) are not so strong as the first pair, and are composed of five articulations also, the last of which is terminated by one strong curved hook. The first pair are directed backwards; the second are directed forwards; they want the long filaments which the first pair possess, and are thus only used for walking with. The third pair (Fig. 1. *g.* Fig. 5,) arise immediately behind the second pair, and consist of four articulations;* the last of which is terminated by two short hooks, and has a filament thrown back from its extremity, like a spur. They are curved upwards and backwards, and are always contained within the shell, never being extruded. Their use, according to Straus, is to support the ovaries. Jurine considers them as somehow connected with the matrix, but says he is ignorant of their use; the figure which he gives of them is very incorrect. Mouth.—The mouth is situate in the inferior surface of the anterior lobe of the body, and consists of a lip, a kind of sternum,† performing the functions of an inferior lip; a pair of palpiferous mandibles, and two pairs of jaws. The lip, (Fig. 6, *a.*) says Straus, is composed of a great scaly piece like a hood, forming a projection which advances between the two anterior feet, and is fixed to the body by four long apophyses. The sternum, or lower lip, (Fig. 6. *b.*) according to the same author, is elongated, triangular, and moveable, articulates with the lip, and has at its extremity two curved apophyses to articulate it with second pair of jaws. The mandible (Fig. 7. *g.* Fig. 1. *h.*) is very large, and is formed of two pieces. The larger, or mandible, properly so called, (Fig. 7. *a.*) is terminated at superior extremity by a point, and at the lower or incisive extremity by five pretty strong teeth. The other piece is in the form of a regular palpus, (Fig. 7. *b.*) which issues from about the middle length of the proper mandible, and consists of three joints, provided with several setæ, the first of which joints has, near its base, a very small branchial plate, (Fig. 7 *c.*) terminated by five digitations. This palpus is the second pair of feet of Jurine, the “barbillon,” of Muller, the use of which, both agree, is to cause a current of water towards the mouth, carrying with it the particles destined for the insect's food. The first pair of jaws (Fig. 1. *i.* Fig. 8,) have for their base a large square-shaped plate, (Fig. 8. *a.*) furnished at anterior

* Straus says five.

† Straus.

extremity with four fingers, the superior of which is of two joints, the other three of only one, but all terminated by several long hairs. From the external edge of this plate, forming the base, arises a large elongated branchial plate, (Fig. 8. *b*,) which gives off from the superior crescentic shaped edge, a row of nineteen long spines, arranged like the teeth of a comb. The square plate with its fingers must be Jurine's third pair of feet, though if so, the figure which this author gives of these organs, as well as of his second pair of feet, (the palpi of the mandible, of Straus,) is decidedly incorrect. He seems to have been ignorant of the existence of the branchial plate, as he asks, "if it be true that the branchiæ be the first character in the crustacea, where shall we place them in these monocoli? in the antennæ, feet, or tail? we cannot give a preference to any one of these parts over another."*—The second pair of jaws (Fig. 9) are much smaller, and are articulated on the posterior angle of sternum by means of the two curved apophyses at its extremity. Each jaw consists of two flattened joints, the latter of which has several stiff hairs at extremity, and on external edge gives off a rounded finger, which Straus says, he thinks, must be considered as a palpus. The posterior portion of the body is terminated by a long tail, (Fig. 1. *k*. Fig. 10,) consisting of two lengthened stalks, each terminated by two short curved stylets, with a third implanted on upper edge, a little above them. This tail is free, and possesses much freedom of motion, the insect extruding it from the shell at pleasure. One great use of it seems to be to clean the interior part of the shell, which its length and mobility fit it well for; but Straus says also that its use is perhaps to serve for depositing the eggs. The anatomy of the internal parts of the body is more difficult to make out distinctly. The alimentary canal, according to Straus, consists of a short narrow œsophagus, a large oblong stomach, occupying the whole of the dorsal region of the body; and a simple intestine nearly as large as the stomach, becoming narrower towards the posterior extremity, and opening by an anus between the two stylets which form the tail. The ovaries are two large simple, conical vessels, placed externally upon the posterior portion of the body, and open one at the side of the other into the anterior part of extremity of abdomen, where they communicate with the canal formed by the tail. There is another organ, the use of which is not so well ascertained. It is a large and conical mass, situated above the articulation of the mandibles, of a granulated

structure apparently, and of a light colour. Straus says that as he could not see exactly its termination, he is ignorant of its use, but he supposes that it must be either the salivary glands, or the testicles. The heart and nervous system have as yet escaped observation.

Habits, Manners, &c.—The insects of this genus are inhabitants solely of the fresh water, and are to be found in almost every pond and ditch where the water remains stagnant, but not putrid. They are not so prolific as the *Cyclopes*, but in some of the larger species we can count, according to Jurine, as many as 24 eggs. The males have never yet been discovered; and the act of copulation has never been witnessed by any author, with the exception of Ledermuller, who says he has seen them in the act, and gives a representation of them in that state. I have frequently witnessed two individuals in much the same situation as those figured by Ledermuller; but it did not appear to me that at the time they were engaged in copulation; and as neither Muller, De Geer, Jurine, nor Straus, have ever witnessed them in the act, Ledermuller must in all probability have mistaken the nature of their junction. Straus says, that every specimen he has examined has been laden with eggs, which makes him ask—"Are they hermaphrodites? or do the males only appear at some particular season of the year?" Jurine has collected eggs immediately after they had been deposited by the parent insect; has isolated them, and seen them safely hatched. He has then isolated the young ones after they were hatched, and found that they became pregnant without intervention of males. They must either, therefore, be hermaphrodites, or, as in some other genera, as the *Daphniæ* for instance, one copulation suffices not only to impregnate the female for life, but the succeeding generations also. As the males of the *Daphniæ* appear only at particular seasons of the year, and in small numbers, it is probable that the males of the *Cypris* will be found also by succeeding observers. The eggs are perfectly spherical, (Plate XVI. Fig. 11,) and are deposited by the insect upon some solid body, such as part of some plant, &c., in a mass, sometimes, says Straus, uniting some hundreds from different individuals; the mother fixing them to the surface of the body on which they are deposited, by means of some glutinous substance, and then leaving them. When the animal is about to lay, it fixes itself, says Jurine, so firmly in some secure place, that it cannot be displaced by any agitation of the water, and is occupied about twelve hours in the operation. The eggs remain about four days and a-half before they are hatched, and then the young at once assume the appearance of the

perfect insect, though varying a little in the shape of the shell (Fig. 12). According to Jurine they undergo several moultings before they are fit to procreate their species—the frequency of these moultings depending upon the season of the year, and being in proportion to the gradual development of the insect. Moulting continues to take place in the adult after each laying—and as the shells of these little animals become very frequently perfectly covered with dirt and moss, which adhere close to them, this change of covering becomes a useful act to disembarass the insect of a shell become disagreeable to it; while, in the young, their development can only take place by getting rid of the shell as soon as it becomes too small for the body contained within. This renewing of the shell forms a fine example of the process of exuviation, as naturalists call it—the change which takes place being most complete, for not only does the shell itself fall off, but the insect casts off even the external parts of the body, the fine pectiniform branchiæ and minutest hairs clothing the setæ of the antennæ, &c.

The food of these little insects consists of dead animal matter and confervæ, &c. Straus says, he never saw them attack living animals when these were well and strong, but he has frequently seen them attack worms, &c. when wounded and weak. Though dead animal-matter is their choice, they will not, he adds, eat it when putrid. They, no doubt, also prey on each other, as I have frequently seen individuals of one species devouring eagerly the dead carcasses of a species different from themselves.

When the ponds and ditches in which they live dry up in summer, they bury themselves in the mud, and thus preserve their lives as long as the mud retains any moisture—becoming active as ever when the rain falls and again overflows their habitations. After long continued droughts, however, when the mud becomes very dry and hard, they perish; but, as Straus observes, the eggs will not perish along with the parents, but will be hatched four or five days after being placed in water. I have given, in my paper on the *Cyclops*, the result of Jurine's experiments upon the power these insects have of resisting drought; but, though it appears from what is there stated that they will not stand drying quite, yet I have no doubt, from what I have observed in summer, that the *Cyclops* can prolong their existence also by plunging themselves in the mud—for, when examining ponds which had been filled again by the rain, after remaining two months dry, I have found numerous specimens of the *C. quadricornis* in all stages of growth.

These little creatures seem to be very lively in their native ele-

ment, being almost constantly in motion, either swimming about pretty rapidly by the united action of their antennæ and anterior feet, or walking upon the plants and other solid bodies floating in the water. Instead of being, like the molluscos animals to which they bear such a resemblance in external covering, fixed to one place, and condemned to live amidst eternal darkness, they, says Muller, "by opening their valves, enjoy light, and move at their will—sometimes burying themselves in the mud, sometimes darting through the water, the humid air of their sphere. If they meet any unforeseen object they conceal themselves all at once in their shells, and shut the valves, so that force and address seek in vain to open them."*

Species.

Sp. I.—*Cypris pubera*—Plate XVI. Fig. 1–13. Testa ovata reniformis, strigis viridibus obliquis; tomentosa.

Habitat.—Found in Berwickshire: neighbourhood of London, &c.; common.

Synonymes, &c.—*Baker*, Employment for Microscope, p. 387, plate 15, fig. 8? 1753.

Sordid insect. *Muller*, Philosoph. Transact. Vol. lxi. p. 230, tab. 7, fig. 4–7. 1771.

Cypris pubera, *Do.* Zoolog. Danic. prodromus, p. 198, No. 2382, 1776.

Monoculus ovato-conchaceus, *De Geer*, Memoires pour servir, &c. V. vii. p. 476, pl. 29, fig. 6–7, 1778.

Cypris pubera, *Muller*, Entomostraca, p. 56, tab. v. fig. 1–5, 1785.

Monoc. Conchaceus, *Linn.* Syst. Natur. cura Gmelin, 3003, No. 7, 1788.

Mon. Conchaceus, *Manuel*, Encyclopedie Methodique, Hist. Nat. Tom. vii. p. 727, No. 39, pl. 266, fig. 27–30, 1792.

Mon. Conchaceus, *Fabricius*, Entomolog. Systemat. Tom. ii. p. 496, 1793.

Cypris Conchacea, *Latreille*, Hist. Nat. Gen. et Part. des Crust. et Ins. Tom. iv. p. 246, 1802.

Cypris Conchacea, *Lamarck*, Hist. Nat. des Anim. sans Verteb. Vol. v. p. 124, No. 1, 1818.

Mon. Conchaceus, *Rees*' Cyclopedia, Art. *Monoculus*, 1819.

Cypris Conchacea, *Leach*, Edinburgh Encyclopedia, Art. Crustacea, Vol. vii. p. 388.

Monoc. puber, *Jurine*, Hist. des Monocles, &c. p. 171, pl. 18, fig. 1–2, 1820.

Cypris pubera, *Desmarest*, Consid. Gen. des Crust. p. 383, 1825.

Cypris tristriata, *Baird*, Transact. Berwickshire Nat. Club. p. 99, pl. iii. fig. 13, 1835.

There appears to me considerable obscurity amongst authors with regard to this species. Muller's description agrees very well in most respects, but his figure is decidedly bad. The figure given by Jurine is so different from that given by Muller or his description of it,

that they do not appear to be the same species. Misled by the figure which Muller gives, I made it a new species in the Transactions of the Berwickshire Naturalists' Club, under the name of *C. tristriata*, having quoted the young as the *pubera*. The quotations and synonyms of both Muller and Jurine are at variance with each other, and many in both authors are, I think, injudicious and incorrect.

The shell is of an oval shape, and reniform, valves convex, of a green colour, more or less deep; anterior portion of shell of a deep green, immediately behind which is a portion of a lighter colour; posterior part of shell of a less deep green than anterior, and through it run obliquely, from near upper and middle part of shell, two and sometimes three narrow bands of a deeper colour than any other part of shell. In some specimens, generally the largest, the shell is of nearly a black colour, from the dirt which adheres to the valves, obscuring the marks which distinguish the species, and making it appear almost like a different one. Nearly in the centre of each valve are to be seen a congeries of about seven small lucid spots. The whole shell is densely hairy; antennæ of about fourteen filaments, beautifully plumose; filaments of anterior feet about six, also finely pennated.

Sp. II.—*Cypris detecta*.—Testa reniformis, pellucida, plana.

Habitat. Berwickshire and Roxburghshire: neighbourhood of London, &c.

Synonymes, &c. *Ledermuller*; Mikroskopischen Gemüths und augenergotzung, p. 140, tab. 73, 1760.

Smooth white insect, *Muller*, Philos. Trans. Vol. lxi. p. 230, tab. 7, fig. 1—3, 1771.

Cypris detecta, *Do.* Zoolog. Dan. prodrom. p. 199, No. 2386, 1776.

Cypris detecta, *Do.* Entomostraca, p. 49, tab. iii. fig. 1—3, 1785.

Monoc. detectus, *Gmelin*, Syst. Natur. 3001, No. 36, 1788.

Mon. detectus, *Manuel*, Encyc. Method. Hist. Nat. Tome vii. p. 725, No. 30, pl. 266, fig. 15—17, 1792.

Monoc. Conchaceus, *Fabricius*, Entomol. Systemat. Tom. ii. p. 495, 1793.

Cypris detecta, *Latreille*, Hist. Nat. Gen. et Part. des Crustaces, &c. Tom. iv. p. 241, 1802.

Monoc. detectus, *Rees*' Cyclopedia, Art. Monoculus, 1819.

Monoc. Conchaceus, *Jurine*, Hist. des Monocles, &c. p. 171, tab. 17, fig. 7—8, 1821.

Cypris Conchacea, *Desmarest*, Consid. Gen. sur les Crust. p. 383, 1825.

Jurine quotes as synonymes of this species, but unadvisedly in my opinion, the *Mon. Conchaceus* of Linnæus' Fauna Suecica, the description of which, I have already said, would answer any other species as well—the *Mon. à coquille longue* of Geoffroy, and the *Mon. ovato-conchaceus* of De Geer. The first of these two last is also

quoted by Muller, as synonymous with his *C. pubera*, and the latter bears very little resemblance in figure to that which he gives himself.

The shell is of an oblong shape, the valves flatter than in most of the other species, and on lower margin sinuated or kidney-shaped. Its colour is of a dull white, without any peculiar spots, or markings; it is pellucid, smooth, and free from hairs.

(To be continued.)

ART. III.—*Contributions to British Ichthyology.* By R. PARNELL, M. D.

ON the coast of Devon are to be found all the Gurnards that are mentioned by Mr Yarrell, in his excellent work on the British Fishes, *Trigla cuculus*, *T. hirundo*, *T. lineata*, *T. lyra*, *T. gurnardus*, and *T. Blochii*, and I have the pleasure of adding another to the list, *Trigla lucerna*, of Brunner, which is so little known, as to have been omitted by British writers. It is interesting to mention, that Rondeletius was the first who figured this fish. He obtained it from the Mediterranean. Brunner afterwards received a specimen from Marseilles, and named it *Trigla lucerna*. Risso also makes mention of one being taken at Nice, and Cuvier, who obtained specimens from Naples, has given a good figure of it in his *Histoire Naturelle des Poissons*, pl. 72.

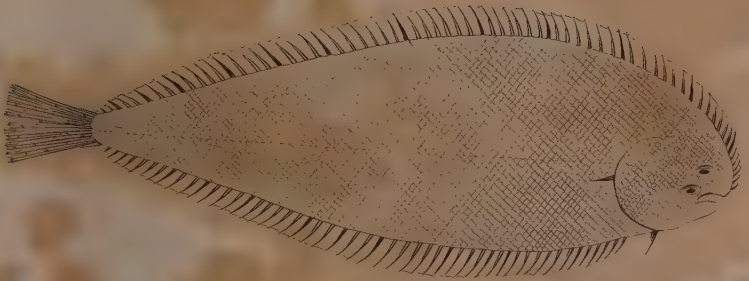
I. TRIGLA LUCERNA.

It is astonishing how this fish could have escaped the notice of British naturalists, as it is by no means rare. It possesses such strong specific marks of distinction, that it has been known to some of the fishermen at Brixham, for the last thirty years, by the name of "Long-finned Captain," and is esteemed the sweetest and the most delicate of the British species; but, owing to its small size, it is scarcely ever brought on shore, being returned again to its native element as unfit for the markets. In September last, while engaged in the pursuit of natural history, I saw, taken at one haul of a trawl-net, seven of these fish, scarcely one of which could be considered perfect, having the intervening membrane of the rays more or less destroyed.

Description.—The largest specimen that I have observed measures $10\frac{1}{2}$ inches in length, and $1\frac{1}{4}$ in depth. The head, back, the two dorsal, and the caudal fins, are of a rose red, while the under part,



Thalassoma longipinnis Gunter
Long finned wrasse.



Thalassoma marginatum Gunter
Surge wrasse.

R. Barnard del. & sculp.



together with the ventral and anal fins, are of a dirty white, more or less shaded with red. The pectoral fins are of a deep blue colour, particularly on the inner surface. The first dorsal fin commences in a vertical line over the base of the pectorals, and terminates at the origin of the second dorsal, which runs down the back to within $1\frac{1}{4}$ inch of the base of the tail. The anal fin commences under the second ray of the last dorsal, and ends at a little behind the termination of the same fin. The pectorals are rather large, a little longer than the ventrals, and reaching as far as the second ray of the anal. The first ray of the anterior dorsal fin is spinous, about $1\frac{1}{2}$ inch in length, not half the length of the second, which is setaceous as well as the third. The fourth ray is spinous, as well as the remainder of the rays of that fin. The anterior rays of the second dorsal fin are longer than the terminating ones; the tail is lunated, with each extremity of equal length.

The numbers of the fin rays are:

1st D. 9; 2d D. 17; P. 12; and 3 free; A. 18; C. 9; V. 6.

The head is one-fifth the length of the whole fish. On each side, a little below the lateral line, is a broad light metallic band, extending from the operculum to the base of the tail. The lateral line is smooth, broad, and slightly elevated, composed of a series of semi-circular plates, beautifully radiated at their free border. The dorsal ridge is formed of twenty-four sharp serrated plates, extending from the first to the last dorsal ray. The scapular spines are very short. The eyes moderate; two spines situated at the upper and anterior margin of each orbit. The snout slightly dentated and rather blunt at its extremity. Body smooth; scales oval and entire; the air-bladder is bilobed, with the coats remarkably thick and opaque. In none of the specimens could I find any appearance of roe.

This fish can be readily distinguished from every other species of the same genus yet known, by the form and arrangement of the lateral plates, and by the elongated second ray of the first dorsal fin, which, when folded down, reaches beyond the sixth ray of the second dorsal fin.

2. MONOCHIRUS MINUTUS.

This species of Sole is undoubtedly an addition to our British Fauna, and seems unknown to Cuvier, Brunner, Bloch, Risso, or to any other author whom I have consulted; but how far it is new to science remains to be determined by future research. Perhaps I may have

been misled by the laconic style of these writers on Ichthyology ; but I will endeavour, by more ample description, to remove it in future beyond the reach of doubt. From the numbers of these fishes which are taken in the trawl-nets off Brixham throughout the whole year, and from their never appearing to attain a large size, there can be little doubt but that they are arrived at their full growth, from which circumstance I have proposed the specific name of "*minutus*." The fishermen, who appear perfectly familiar with their appearance, call them red soles, and scarcely a trawl boat leaves Brixham harbour that does not capture a dozen or more of these fish daily ; but, from their diminutive size, they are either thrown overboard, or left to decay at the bottom of the vessels.

Generic character.—Pectoral fin on the eye side very small, that on the opposite side rudimentary. (*Monochirus*, Cuvier.)

Specific character.—Every sixth or seventh ray of the dorsal and anal fin, black.

Description.—Length 5 inches ; the width at the upper third nearly 2 inches ; the colour of the back light reddish brown, the under surface pale white. In shape it is similar to the common sole (*Solea vulgaris*) but of a more wedge-shaped form, becoming narrower at the caudal extremity. The head is small, one-sixth of the whole length ; the mouth is twisted, the angle of which reaches as far as under the middle of the left eye. Each jaw is furnished with a number of minute teeth placed close together, and extending but half-way round the mouth ; the eyes are small, the left one a little in advance. The dorsal fin commences immediately over the upper lip and runs down the back, to be connected with the caudal rays ; the anal fin begins under the posterior margin of the operculum, and continues within a short interval of the tail. The numbers of the fin rays are :

D. 73 ; P. 4 ; V. 4 ; A. 54 ; C. 14.

The scales are small, with from twelve to fifteen denticles at their free extremity, rendering the whole surface of the fish rough to the touch, when the finger is passed from the tail to the head. The pectoral fin on the eye side is small with the lower half black, while the fin on the opposite side is very minute, and of a pale white ; the lateral line is straight throughout ; the tail is rounded at the end, and mottled with brown.

The only fish the present one seems likely to be confounded with is the *Monochirus lingula*, or red-backed sole ; but they will be found to differ widely from one another. In the red-backed sole

there is a distinct interval between the dorsal and caudal fins ; the tail is margined with white ; the anal and dorsal fins are marked with six or seven blackish spots, which extend beyond the base of the rays, towards the body of the fish ; and its shape is of an oblong form. None of these characters apply to the *Monochirus minutus*.

(*To be continued.*)

IV.—*Miscellanea Zoologica*. By GEORGE JOHNSTON, M.D., Fellow of the Royal College of Surgeons of Edinburgh. Plates XVII. XVIII. (Continued from p. 382.)

II.—A DESCRIPTION OF SOME PLANARIAN WORMS.

Class ENTOZOA, *Rudolphi*.—VERMES, *Lamarck*.

Order STERELMINTHA, *Owen*.—V. MOLLES, *Lamarck*.

Family Planulariæ, *Lamarck*.

Genus *Nemertes*,* *Johnston*.

CHARACTER.—*Body linear-elongate, contractile, somewhat compressed, soft, even and continuous : anterior extremity mostly with several ocelliform points, and two occipital approximate spots marking the position of a double centre of circulation : mouth a simple terminal pore : anus terminal.*

OBS.—The worms which I include in this genus are of a linear form and very contractile, so that when extended in the act of moving through the water or mud, they exceed their length when at rest by three, four, or more measures. They are soft and glutinous, but with more firmness of structure than their appearance indicates ; and to the naked eye they are perfectly smooth, exhibiting no trace of articulations or wrinkles, though when contracted and viewed through a magnifier, we find that the margins are minutely crenulate. The anterior extremity is usually marked by several black specks arranged on each side of it, variable in number according to the species, and which are considered by Muller and others as organs of vision. We are not able, with our small microscope, to discover any peculiar organization in them, yet there is reason, (notwithstanding the objection of Lamarck, founded on the want of optic nerves and a nervous system, †) to assent in this opinion, from

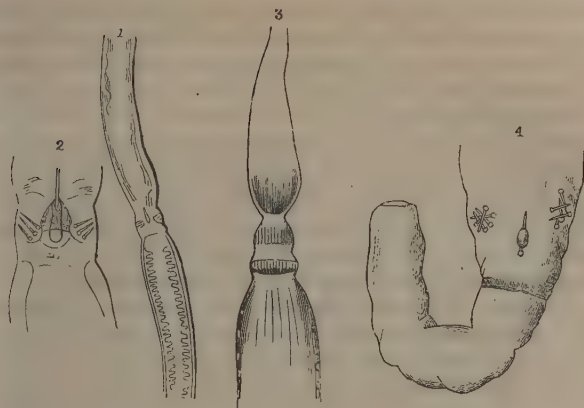
* *Nemertes*—one of the *Nereides*.—The genus so named by Cuvier (*Reg. Anim.* iii. p. 259,) for the reception of the sea Long-worm of Borlase, had been previously named *Lineus* by Sowerby ; and Cuvier's name being thus unnecessary, I have thought myself warranted in taking it as the designation of some worms nearly allied to *Lineus*, but which are certainly generically distinct.

† *Hist. Nat. des Anim. s. Vert.* iii. p. 177.

the exact resemblance of these points to the eyes of the annelidans,* and from the very obvious manner in which the worms evince their sensibility to the impressions of light. The species have no other visible exterior organs: they move in an even continuous manner by undulations, frequently imperceptible, propagated along the body, which they often throw into knots and strictures, or extenuate to that degree, that the ordinary breadth shall be more than four times its diameter when in this state of extension.

The internal structure is most easily seen when the worm is slightly pressed between plates of glass, and placed under the microscope. It is more beautiful and complex than the plainness and simplicity of the exterior would lead us to believe, nor indeed can I unravel or describe it with the accuracy that is desirable. The mouth is difficult to be detected, and its position and form are generally indistinct, but sometimes it becomes evident enough, and in other cases, its exact place is often shown by a slight sinus or emargination in the anterior extremity in which it is placed: it is a simple circular pore without any hard parts. (Plate XVIII. Fig. 5, *m.*) From it an intestine descends down the centre of the body, in a straight or undulating line, according to accidental circumstances of position, to the opposite extremity, where it opens outwardly by a pore similar to the mouth, and equally simple. The intestine (Pl. XVII. Fig. 5 *i. i.*) is a cylindrical tube of a firmish texture, and of nearly equal calibre throughout, though subject to partial and temporary constrictions and dilatations, and, as just remarked, its course can be made straight or tortuous at the will of the animal, evidently to accommodate it to the length of the body in its extreme variations, for being apparently of a much less contractile tissue than the body itself, the intestine is doubled in sinuous folds when the worm contracts and shortens, but when this draws itself out in a long line, the intestine becomes a straight canal, with something of the character and office of a vertebral column. In tracing the intestine from the mouth downwards, the structure appears to be homogeneous, and alike throughout in the species placed in the second section of the genus, but in the true Nemertes, we meet with some remarkable peculiarities towards the middle of its course. First, we perceive on each side a small circular spot or cavity, in each of which are three spines (Fig. 1, 2, 4,) with their sharp points directed outwards; beneath these there is a cup-shaped organ (Fig. 3,) encircled above with a faintly plaited

* See Muller "sur les yeux problématiques des Annelides," in the *Annales des Sciences Nat.* xxii. p. 19; and Grant's *Outlines of Comparative Anatomy*, p. 252-3.



membrane, and armed in the centre with a strong spine, which can be compared to nothing more aptly than to a cobbler's awl in miniature, the part representing the handle being very dark, and the point transparent and crystalline, (Fig. 2, 4.) This apparatus is placed within the intestine, is visible only when this is compressed, and is, as I believe, stomachical, having some distant analogy with the proper digestive organs of the *Laplysia* and *Bulla*; and in confirmation of this view it may be remarked, that the œsophageal part of the intestine appears to be simple, while the inferior portion exhibits a plaited structure internally, (Fig. 1, 3.) In our Pl. XVII. Fig. 5, this part is represented as being suddenly narrowed, and after descending a little it bends and ascends for some way, when it is again deflected and ends abruptly in the body; and such undoubtedly were the appearances in the specimen from which the drawing was made, and in others which I have examined; but such a disposition of parts is rather uncommon, the usual course being for the intestine to descend tortuously to the anus. I believe that in the contrary instances, the natural adhesions of the alimentary tube have been ruptured by the compression to which the body had been subjected, and that by its contractions, the intestine was then forced into this unnatural position, for that the intestine terminates and opens at the posterior extremity is certain, the contents having repeatedly been seen to be evacuated there through a small pore. While examining specimens, a large portion of the intestine will occasionally be seen rolling itself from the mouth, like a very long proboscis, until perhaps fully one half of the tube is evolved,—a fact which I also attribute to the compression of the plates of glass, for I have

never observed the worm naturally to evolve a proboscis, though every pains may be taken to force it to do so, by irritations, by keeping it in sea water until it corrupts, by immersion in fresh water, or in spirits.*

The intestine lies loose in a distinct abdominal cavity (Pl. XVII. Fig. 5, and Pl. XVIII. Fig. 1,) or canal excavated through the centre of the body. This canal seems to contain besides a grumous fluid, which may frequently be observed moving rapidly up and down in irregular currents dependent on the contractions of the worm or intestine, and not at all analogous to the currents within the tubes of zoophytes. It is fringed along each side with a close series of vesicles or cells formed, in the true Nemertes, apparently by the folds of a membrane, while in the sub-genus *Borlasia*, they are separate, and as it were excavated in the parenchyma of the body, (Pl. XVIII.) The resemblance between this structure and what have been called *cæcal appendages* in some allied worms is obvious, † though not very exact, for they are not produced from, nor in organic connection with the alimentary canal, as is manifest from their remaining unaffected during the motions of the latter, which moreover may be removed entirely from the body without bringing with it, or tearing away, the presumed cæca. These are always full of some opaque matter in the Nemertes, and some observations lead me to believe, that it varies in intensity at least according to the nature of the animal's food, whence I conclude they belong chiefly to the digestive system; while the ova appear to be developed in their interstices, and in the space between them and the skin, (Pl. XVII. Fig. 2.) But in *Borlasia* the cæca are more distinctly vesicular and isolated, and although the depth of colour of their contents varies also, yet they are usually clearer and paler than the surrounding parenchyma, or as it were empty, and I have plainly seen in them, not often, indeed, oviform bodies, which again have not been detected in the interstices, (Pl. XVIII. Fig. 3.) We seem, then, to have combined in them a duplicity of function,—they are both nutrient and

* In some cognate species, Otho Fabricius observed the intestine to be extruded when no compression was used, but still under circumstances easily reconcileable with our explanation. "De orificio antico infero tubulum pallidum in agone mortis exserit:" *i. e.* *Planaria rubra*, Faun. Grœnl. p. 324; also p. 325.

† Compare our figures of this structure with that of the *Diplozoon paradoxum* of Nordmann in Ann. des Sciences Nat. V. xxx. p. 382, pl. 20. This figure, on a reduced scale, is copied into the Cyclop. of Anat. and Physiology, i. p. 654, fig. 328; and into Kirby's Bridgewater Treatise, pl. 1. B. fig. 4. The comparison may be usefully extended to the *Annelides*, Cyclop. of Anat. and Phy. i. p. 169, fig. 70; Roget, Bridgew. Treat. ii. p. 103, fig. 260; and to the *Tæniæ*, Ibid. ii. p. 83, fig. 247.

uterine cells,—but how far this view can be admitted, I must leave to the determination of some better observer.*

Many specimens, and several species, had been examined before a trace of a nervous system could be detected, and I was ready to conclude that these worms were truly acritous, when I was prevented falling into this error by the discovery of it in the *Nemertes octocolata*. In this species the nervous system is distinct, and I have been able since to see it in several others more obscurely. It consists of a single oblong or ovate ganglion laid over and above the œsophagus posterior to the heart; and from this ganglion nervous threads radiate in every direction, which are unbranched, of nearly equal sizes, and soon lost in the body. (Pl. XVIII. Fig. 2.) The system has obviously a nearer relation to that of some of the lower Molluscs than to any of the typical annelidans, a fact which, however, is not anomalous, for Mr Owen has made the same remark in reference to some intestinal worms.†

The circulating system appears to be complete, though very simple. Immediately behind the eyes there may be observed a roundish spot on each side of a reddish colour, indicating the position and figure of organs which are perhaps the centres of this system. These organs are connected by a cross vessel; and from their inferior aspects a fine vessel departs which, running along each side between the intestine and skin, encircle the body with a continuous canal of equal calibre in every portion of its long circuit. (Pl. XVII. Fig. 5.) It is uncertain whether these side-vessels are connected by smaller transverse inosculations: I believe they are, and that the pale lines which we observe to cross the body in some species, at short and regular intervals, are produced by these vessels of communication. (Pl. XVII. Fig. 1.) On examining Fig. 5. another vessel will be seen winding down the middle, along the surface of the alimentary canal, in an undulating line. That it has any connection with the centre of circulation or lateral vessels I cannot affirm, for I could neither trace its origin, nor its place of termination, nor can I perceive that any vessel goes from it, but we may be allowed

* Since this was written, farther observations have almost satisfied me that the apparent differences in the formation of the cœca in these subgenera are dependent, in a great measure, on the state of the worm in regard to repletion,—the distinct vesicle-like spaces being formed by the extension and coalescence of the cœca around a space filled with ova, which would seem therefore to be always exterior to the cœca.

† Proceedings of the Zool. Soc. of London, pt. iii. p. 28; and Trans. of the Zoological Society, i. p. 328–9.

to infer, from its analogy with the Planariæ,* that it belongs to the circulating, and not to a nervous system. I have never detected the slightest appearance of a fluid in motion in any of the vessels ; and were I to call the central vessel an aorta, and to decide that the lateral vessels were for the purpose of returning the reflux fluid to the heart, I might justly be censured for indulging in a fancy which has no observation in its support. We are too liable to assign to the organs of these lower creatures the names of what we deem their analogues in higher classes, and with the name to associate an idea of sameness or identity in their functions,—a propensity which has not seldom led to error.

The Nemertes live under stones and in mud between tide marks : they avoid the light, and love obscurity. They are numerous in individuals, but how they are propagated is yet conjectural. At certain seasons I have seen within the body small roundish oviform grains lying unconnected with any particular viscus, but of the real nature of these, no observation has enabled me to form an opinion. Specimens have also occurred in which there seemed to be a beginning separation of the body into two or more parts, but these marks of division might be the effect of injury. The species are very tenacious of life : if cut into several pieces, each lives and moves, and perhaps in time each will grow up to a complete and perfect worm. When placed in fresh water they shew, by instant contortions, how painful and poisonous is this fluid to them. They soon break into pieces, disgorge portions of the viscera, and speedily die and dissolve into a soft jelly.

* *A gizzard near the centre of the alimentary canal, armed with spines.*—Subgenus NEMERTES.

1. *N. gracilis*, of a uniform olive-colour, very long and filiform ; eyes numerous. (Plate XVII. Fig. 1.)

HAB. Under stones near low water-mark. Berwick Bay.

This worm, when drawn out to its ordinary length, as in the act of creeping, measures about 20 inches, while it is not more than a line in breadth : body linear or somewhat attenuated at the posterior extremity, compressed, smooth, soft and glutinous, very contractile, of a uniform olive-green colour, lighter on the ventral surface ; when viewed through a common magnifier it is seen to be marked with numerous pale cross lines, and the sides appear lighter than the centre : head obtuse, rounded in front, tinted with yellow, and dotted with numerous eyes along each side reaching to the two orange-co-

* See figures illustrative of this in Roget's Bridgew. Treat. ii. p. 250, fig. 346 ; and in Cyclop. of Anat. and Physiology, i. p. 653, fig. 327.

loured spots, which are about one-eighth of an inch from the extremity.

2. *N. lactiflorea*, of a uniform cream-colour, often dusky down the middle, linear-compressed; eyes many. (Plate XVII. Fig. 2.)

Planaria lactiflorea, *Johnston*, in Zool. Journ. iii. 489.

HAB. Under stones between tide-marks—common in Berwick Bay.

Body linear, vermiform, about three inches long when extended, but very contractile and polymorphous, smooth, of a uniform cream-colour in general, sometimes flesh-red, often dusky down the centre from the opaque contents of the intestine, marked with two red spots near the head, anterior to which are the ocelliform specks arranged on the sides in two more or less perfectly separate clusters: the eyes are unequal in size, and about 12 in number on each side: mouth subterminal: anus terminal.—When compressed, or otherwise irritated, this species has been repeatedly noticed to exude a milky fluid from its whole surface.

There is what I consider to be a variety of this species of a reddish orange-colour, with dusky undulations down the middle from the interranea. (Plate XVII. Fig 3.) It is comparatively rare, and the depth of its colour may proceed from some difference in food, or in its state of repletion. The resemblance between it and the *Planaria rosea* of Muller (Zool. Dan. tab. 64. fig. 1, 2,) is sufficiently great to suggest a suspicion of their identity, but Muller expressly states that the latter is destitute of eyes. (See the Prod. Zool. Dan. p. 221.)

3. *N. quadrioculata*, of a yellow colour tinted with green; narrow, elongate: eyes 4, remote. (Pl. XVII. Fig. 4.)

Planaria quadrioculata, *Johnston*, in Zool. Journ. iv. 56.

HAB. Sea shore under stones, rare. Berwick Bay.

Body $1\frac{1}{2}$ inch long, soft, flattened, contractile, narrowed towards the tail, of a yellowish maculated colour, with a dirty greenish intestinal line down the middle; mouth rounded; eyes 4, placed in a square form and rather distant.—The maculated appearance proceeds from white oviform bodies.

4. *N. melanocephala*, yellow or yellowish-green, linear-elongate; head with a dark transverse spot, and 4 eyes. (Plate XVII. Fig. 5.)

HAB. Between tide marks. Berwick Bay, not common.

Body from 1 to $1\frac{1}{2}$ inch long, narrow and vermiform, tapered at

the tail, of an olive or yellowish colour, the latter tint most predominant in front, which is marked with a black spot of a quadrangular form, and 4 eyes placed nearly in a square. It was in this species that the structure peculiar to the genus was most easily to be traced.

5. *N. pulchra*, linear-elliptical ; of a flesh-red colour, with a series of scarlet spots along each side, or of a uniform aurora-red ; eyes numerous, unequal. Plate XVII. Fig. 6.

НАБ. Amongst corallines, and in old shells, &c., in deep water. Coast of Berwickshire, frequent.

Body about an inch in length, and two lines in breadth, compressed, narrow, elliptical, the front marked with numerous black specks, irregularly arranged and visible with the naked eye. Many specimens are of a uniform aurora-red colour, considerably paler on the ventral aspect, while others are beautifully marked along each side with a series of large scarlet spots ; the former are perhaps males, or more probably individuals in a barren condition, while the others seem to be full of mature ova, for an examination of the spots through the microscope shows that they are produced by clusters of oviform bodies lying in the interstices of the cœcal appendages.

This and the first species contrast remarkably in their form, and show the extremes to which this character is subject. The structure of the stomach is like that of its congeners, excepting in there being five or six spines on each side of it, instead of three, which is the usual number. Immediately under the hearts, we observe a large, somewhat muscular viscus, apparently hollow, and lying in the course of the intestine, but apparently unconnected with it, for in the individual which served for our figure, the intestine had been extruded from the body, and entirely expelled by the contortions of the worm produced by impure sea-water. Of its office and nature I can offer no opinion, but I may remark that in all the species a greater duskiness in its site shows that a similar organ exists in all.

* * *Alimentary canal apparently homogeneous throughout.* Subgenus, *BORLASIA* *

6. *N. olivacea*, of a dark olive colour ; eyes four, placed in a square. Plate XVIII. Fig. 1.

* A name given by Oken to the *Lineus* of Sowerby, co-equal therefore with the *Nemertes* of Cuvier, equally unnecessary, and as originally applied altogether inadmissible. Because it commemorates a worthy naturalist, Dr William Borlase, author of the History of Cornwall, I rejoice in being able to affix it to a group hitherto uncharacterized.

Planaria bioculata, Johnston, in Zool. Journ. iv. 56.

HAB. Between tide-marks. Berwick Bay.

Of a dusky olive colour, often tinted with purple in front, and paler at the posterior extremity, which is more acuminate than is common in the genus: body linear and narrow, from three to six inches long, a line or so in breadth; smooth and compressed: anterior extremity rounded, obscurely marked with a red spot over the site of the heart. In the Zoological Journal, I have described this species as having only two eyes, but as this appears to be a mistake, or at least not constant in the species, it has become necessary to alter its designation.

When pressing a portion of the body between the plates of glass, I have occasionally seen some bodies escape, of a curved fusiform shape, acute at both ends, and marked towards one of them with a pale circular spot. Plate XVIII. Fig. 1. They have shown no signs of life, nor can I say what they are, though it has occurred to me, that they may be embryo-young; and that the worms may in fact be *ovo-viviparous*.

7. *N. octoculata*, of a uniform light reddish-brown colour; eyes 6 or 8, placed in opposite pairs on the sides of the head. Plate XVIII. Fig. 2.

Planaria octoculata, Johnston, in Zool. Journ. iv. 56.

HAB. Under stones, between tide-marks. Berwick Bay.

Body linear, narrowed posteriorly, 3 inches long, and about $\frac{1}{8}$ th of an inch broad, compressed, of a light reddish-brown colour, with a darker spot in front over the hearts: eyes 6 or 8, and in some specimens I have seen 7, three on one side, and four on the other. It appears therefore, that the number of the eyes, on which Muller and others have reckoned confidently as a good and invariable character, is not to be implicitly relied on.

8. *N. purpurea*, of a uniform purplish-red colour, paler underneath; eyes 6-8. (Plate XVIII. Fig. 3.)

HAB. The sea shore under stones. Berwick Bay.

Worm 2 or 3 inches long, smooth and glutinous. From the darkness of its colour, the spot indicating the position of the heart is scarcely visible until the body has been compressed. The number of eyes is the same as the preceding, and liable to the same variety. In this species the ova were distinctly seen to be contained within the coecal vesicles, which, when compressed, assumed a pyriform shape, having the slender end toward the intestines.

9. *N. rufifrons*, of a yellowish colour verging on rose-red anteriorly; mouth dark red; eyes none; body very slender. (Pl. XVIII. Fig. 5.)

HAB. Under stones between tide-marks, in Berwick Bay, frequent.

When fully stretched out in creeping, this worm is fully two inches long, but very narrow and filiform, or rather tapering to a point posteriorly; it is of a yellowish colour for the greater part, but the anterior extremity is a rose-red, while the apex or mouth forms a dark red speck. When slightly compressed between plates of glass the intestine may frequently be seen unrolling itself from the circular and terminal mouth in the manner that some annelidans unroll their proboscis. The worm will thus sometimes nearly disembowel itself. The intestine is white, round and filiform, without any appendage.

Explanation of Plates.

Plate XVII. Fig. 1, *Nemertes gracilis* of the natural size. 1. * Anterior portion of the same magnified; Fig. 2, 2, *N. lactiflorea*, both figures of the natural size. 2. * Anterior portion magnified. 2 * * Caudal extremity magnified, shewing the ova exterior to the cœca; Fig. 3, *N. lactiflorea*, var. *brunnea*. 3. * The head magnified; Fig. 4, *N. quadrioculata*, natural size; Fig. 5, *N. melanocephala*, natural size. 5. * The same magnified; Fig. 6, *N. pulchra*, natural size. 6. * The head of the same magnified.

Plate XVIII. Fig. 1, 1, 1, *Nemertes (B.) olivacea*, of the natural size. 1. * The anterior and middle part magnified. 1 * * Embryo young? of the same contained in the body of some specimens. Fig. 2, *Nemertes (B.) octoculata*, natural size. 2. * The anterior portion magnified; Fig. 3, *Nemertes (B.) purpurea*, natural size. 3. * The head, and a portion of the middle, and the tail magnified, shewing the ova within a kind of vesicle. Fig. 4, *Nemertes (B.) rufifrons*, natural size. Fig. 5, A portion of the anterior extremity magnified.

Of the wood-cut Figs. 1, 2, represent the stomach and a portion of the intestine of *Nemertes lactiflorea*; 3, and 4, of the *N. pulchra*; 3, shewing it previous to being compressed, 4, after being compressed between plates of glass.

V.—Notes regarding the distinctive habits of the Scotch *Phocæ* or Seals. By JAMES WILSON, F. R. S. E., &c.

THE genus *PHOCA* of Linnæus, comprising a large amount and a considerable diversity of species, has like other great natural groups been separated into several minor genera by modern naturalists. The teeth differ considerably both in their form and position, and when accurately ascertained and distinctly described, will no doubt aid the systematic observer in his arrangement of the species. All agree in having five toes to both extremities. Those of the fore paws usually diminish in size from the innermost or thumb, to the outermost or little finger, while on the hind feet the lateral toes are the largest, and the others diminish towards the centre. The form of the head, especially in the smaller species, usually bears resemblance to that of a dog,—while in their natural cunning and intelligence, and in their capability of being tamed and instructed, they exhibit a still farther likeness to that sagacious creature. They prey chiefly on fish, and are extremely destructive to salmon and other gregarious species, along our shores, in estuaries, and at the mouths of rivers. They seldom, however, ascend the fresh waters to any considerable distance from the sea,—for the alleged occurrence of seals in remote Siberian rivers and the inland waters of Lake Baikal, is a fact which requires confirmation.*

Although extensively distributed over the waters of the ocean, it is in high latitudes (whether northern or southern) that seals occur in greatest abundance,—such as inhabit tropical regions being, as it were, insulated from their kind, and occurring in less numerous assemblages. The species are so vaguely described by voyagers, and have been even as yet so indifferently characterized by naturalists, that their geographical boundaries are by no means well defined; but we may rest assured that those authors are in error who describe our northern kinds as occurring equally among Antarctic icebergs. All other animals have limits which they do not pass, and seals are doubtless subjected to a corresponding restriction. For example, the gigantic species called the sea elephant (*Phoca proboscidea*, Desm.) is never found in the northern hemisphere, while such of the smaller southern species as have been examined, are found to differ from those of corresponding size, which are native to the European shores. Peron is of opinion that the *Phocidæ*, in reference to their natural location, form three great geographical groups, of which two are northern (Atlantic and Pacific,) and one

* See Krachenninikow's *Voyage en Sibirie et au Kamtschatka*, T. ii. p. 421.

southern, and that the species of each of these regions are peculiar to itself. He inclines to apply the same principle to the cetaceous tribes,—but in neither case has he sufficiently considered the numerous species which occur in temperate and equatorial regions. A proper exposition of the species of the Mediterranean and the Euxine, and their comparison, on the one hand, with those of the north, and, on the other, with such as are known to occur in the enclosed waters of the Caspian, the Red Sea, the Persian Gulf, the Indian Ocean, and the frozen waters of the extreme south, would prove to be subjects both of interest and utility. It is indeed singular that animals so important in the scale of creation, whether we regard their great economic value to mankind, their position in the system of nature, or their peculiar organization and singular habits of life, should hitherto have attracted so superficial a notice on the part of naturalists.*

Any critical observations regarding the inadequate manner in which the numerous foreign species have been distinguished, would come with a bad grace from one, who, having it in his power to study the habits and ascertain the distinctive attributes of the few which frequent our island shores, has yet failed to effect that discrimination. Something, however, is occasionally gained by calling attention to the fact of our being comparatively ignorant of what might be ascertained by many, without much exertion, and therefore, while confessing that I have not yet studied the structure of our native kinds, and am still unqualified to assign their distinctive characteristics, I make no apology for offering the following brief notes regarding their natural habits.

Our western islands are supposed to be frequented by three different species of seal, although only two are usually recognized by systematic writers.† All of these have been repeatedly observed by my principal informant.‡

The largest of these is at least double the dimensions of either of the other two. It is known by the native name of *Tapvaist*, and although it associates occasionally with the other kinds, yet it differs in many respects in its habits. I presume it to be the species usually designated by our British writers as the Great Seal, or *Phoca barbata*. It occurs occasionally along our eastern shores,§ and, from the great size of a seal shot some years ago, near Stonehaven, by the late Lord Cassilis, I infer it to have been a *Tapvaist*. It spreads, however, far and wide along the icy arctic shores.

* *Encyclopædia Britannica*, 7th edition, Vol. xiv. p. 123.

† See note at the conclusion of this article.

‡ Mr Archibald M'Neill (of Colonsay.)

§ Is frequent on the Fern Islands.—ED.

Our second species in point of size is by much the most common, and is known among the inhabitants of our western isles by the name of *Raun* or seal. I presume it to be the *Phoca vitulina* of naturalists, our common seal,—of which, in spite of its frequency, the distinctive characters and *synonymy* are still but vaguely ascertained.

Our third species is of considerably smaller size, and is known to the natives by the appellation of *Bodach* or old man. Though not so rare as that first alluded to, it is by no means common. I am not aware that any specific appellation has been bestowed upon it by naturalists, nor do I know that it has yet been described *secundum artem*, or even entered in any of the scientific catalogues.

I have already stated that the *Tapvaist* or great seal is observed occasionally on shore with individuals of other kinds; but notwithstanding this it may be characterized as being of solitary habits, and as frequenting the most remote and undisturbed situations. It is neither so lively nor so watchful as the common seal, nor is it so easily alarmed. It resembles that species in its general colouring, but may at once be distinguished from it by its enormous size. One of the most characteristic and distinctive traits in its history is derived from its period of production, viz. the end of September or commencement of October,—while that of the common seal is usually the beginning of June. In the young also, of these two species, there is a notable difference. That of the *Tapvaist* when whelped, if I may use the expression, is covered with white hair, greatly resembling the short coarse coating of a goat. This covering continues for many weeks, but is at length cast, like the nestling plumage of a bird, and the creature then assumes much the same livery as the young of the common seal, the prevailing hue of which is somewhat darker than that of the adults of either kind.

The young of the *Tapvaist* or great seal, (I avoid using the term *Phoca barbata*, because I think our native writers have sometimes applied the names of continental authors, without due consideration, or a requisite comparison of characters,) is invariably whelped above water-mark, and, it is said, during spring tides. They remain in a helpless condition on the rocks, for several weeks, before they can swim, and during this time they cast most of their long hair. When one of these is discovered by our island sportsmen, they do not immediately approach it, for so strong is the sense of smell, on the part of the parents, that they would certainly take alarm on scenting human footsteps. The sportsman, therefore, conceals himself behind some point of rock within gun shot, and there awaits the onward flowing of the tide, with which the kind but cautious mother invariably returns to suckle her still helpless young. The rifle then achieves its deadly work.

The average weight of an individual of this species, judging relatively from its dimensions when compared with those of the common kind, is somewhere about thirty stone, or 420 pounds. They not unfrequently yield upwards of forty bottles of oil. They have become of late years very rare along the western shores.

The common seal (*Phoca vitulina*, I suppose,) is still to be seen in considerable numbers, but unlike the *Tapvaist* it generally frequents *Sounds*, and flats where fish abound, and where the water is not excessively deep. It is particularly fond of flounders; at least off the coast of Colonsay these fish appear to form its favourite food. This perhaps arises from their being ground fish, and therefore easily caught. Mr M'Neill informs me that he has frequently observed a seal rise to the surface with a flounder in its mouth, and dive again on finding itself unable to swallow its prey, in consequence of its peculiar breadth. When engaged in this attempt, so intent do they become, as entirely to forget their habitual wariness, and they may then be approached and shot with unusual ease. The kind now alluded to produces its young about the beginning of June, and in a very short time after the offspring is whelped it is taken to sea by the mother.

The fishing for the common seal commences in autumn, and is practised by means of nets stretched across narrow sounds between rocks where the seals are in use to swim. In these they entangle themselves, and are taken out either by boat, or in some cases where the net is left dry by the receding tide, by persons approaching them on foot. It is, however, the young ones only that are taken in this way, and even these only during a month or two in autumn.

Seals are fond of going frequently on shore,—for the most part during every tide. They are observed always to select the flattest and most shelving rocks, especially such as have been covered by water at full tide, and still more especially (I may say invariably)* those that are separated from the main land. They generally go ashore about the time of half ebb, and lie together so close as to appear to be almost in contact, to the number sometimes of one, two, or three dozen. With their heads constantly turned towards the sea, and seldom more than a yard or two from it, they seem to enjoy a pleasing repose on terra firma,—their appetites appeased by previous fishing, and a feeling of comfort or of satisfaction produced upon their moistened surface by the genial rays of an invigorating sun. But even in this their hour of rest their customary caution never leaves them, for one of their number is placed a little higher

* We have often approached seals on the rocks of the "main coast," between Aberlady and North Berwick on the Firth of Forth. One or two ledges of rock there, (ten or twelve years since,) were favourite resorts at low water.—ED.

up the rock than the others, and he seems constantly awake, and ever and anon upraises his "grim feature," scenting the windward air. In the position first alluded to the main body frequently fall asleep with their heads I may say hanging towards the water. They generally prefer rocks of small dimensions, and as already mentioned, such as are periodically covered by water. This for two reasons; 1st, because, they are smoother, flatter, and *softer*, being covered with sea-weed; 2dly, because from their comparatively small size, they cannot be approached by human (or inhuman) foes, without observation.

They generally remain on their rocky resting-places, unless disturbed, for nearly six hours,—that is, until the returning tide floats them off upon its buoyant waves. When on shore they frequently utter a grunting noise, not unlike that of a pig in a sty; but they never do so unless they feel perfectly secure. When severely wounded they are heard to express their pain by a peculiar moaning somewhat resembling the lowing of a cow. To what age the seal attains, or at what period it arrives at maturity, I cannot say, but the natives of the western isles suppose it to be long-lived. It not unfrequently attains to the weight of 16 stone, or 224 pounds. A specimen shot by Mr M'Neill, and not regarded as of large size, weighed 12 stone, or 168 pounds. This animal can remain under water nearly five minutes, and swims so rapidly, that during that period, if much alarmed, it will proceed nearly half-a-mile. Though naturally of a timid nature, and always anxious to escape by flight, yet, when driven to extremity, a seal will show determined fight, and the immense power which he possesses in his jaw renders him a rather formidable foe. He moves with considerable force and celerity, at least for a short distance, even on shore; but the moment he reaches the water, and has it in his power to bend his body freely, it would be a vain endeavour, without an almost instantaneous mortal blow, to arrest his onward progress. He seems to receive some slight assistance during locomotion from his fore-paws, but I think none at all from his hind ones. The motion is mainly produced by a peculiar action of the body, somewhat like that of a fish, but rather up and down, than from side to side.

The common seal, though sagacious and extremely watchful, is also characterized by a considerable degree of curiosity, and its attention is obviously attracted by music. It is, however, too cunning to betray itself by any undue indulgence, and a good rifle is far more effectual than either flute or bag-pipe. If very much alarmed when on shore, seals will not return again to the same spot for weeks together, and if more continuously persecuted, they

will desert a particular line of coast entirely. In former times, when many portions of our coasts were less frequented than at present, and these animals were much more numerous, they were in use to clamber to the tops of rocks above water-mark, and there fall asleep. On such occasions they were frequently surprised, and slain with bludgeons. This appears never to happen now,—a proof, among many others which might be adduced, that what we call the natural habits of animals are often regulated by artificial or accidental circumstances.

The third species to which I formerly alluded, is the *Bodach*, or *old man*. This is by much the least of all the seals indigenous to the British shores. Indeed, so small is it, that my correspondent for a long time entertained an idea (in opposition to the prevailing opinion of the natives,) that it was the young of the common kind. This view, however, he afterwards gave up, on seeing specimens not larger than an ordinary seal of three months,—but with grey beards and decayed teeth; and, moreover, when on shore on the same rock with the other seals, they do not lie near them, but a little way apart. They are also few in number, and Mr M'Neill does not happen to recollect having ever seen two of them together. They are not, however, at all so shy as the common seal, nor do they frequent such wild and desert stations as the *Tapvaist*. Our knowledge of this small species is, however, still extremely obscure, and there is no indication of its existence in any of our works on Natural History.*

* Since the preceding notes were placed in the hands of the editor, the 7th No. of Mr Bell's excellent "History of British Quadrupeds" has made its appearance. The British seals are there described as *four* in number, viz. the common species, *Ph. vitulina*; the harp seal, *Ph. Grænlantica* of Muller; the great seal, *Ph. barbata*; and the long bodied seal of Parsons, *Halichærus gryphus*, of more modern authors. The last named is referred to a separate genus, chiefly in consequence of the depth and oblique truncation of the muzzle, and the simple structure of the upper grinders. It appears to correspond with the identical specimen described by Parsons, which, from its great size, was often adduced in proof of the occurrence of *Ph. barbata* along the British shores; but, as Mr Bell has ascertained it to be *Hal. gryphus*, additional doubt is thus thrown on the said *Ph. barbata* as an indigenous kind. The point, however, will be easily determined, on the occurrence of any very large seal, by an examination of the teeth, and their comparison with the characters detailed by Mr Bell. I have now no doubt of the occurrence of *H. gryphus* among our northern islands; a cranium from Shetland, which I had sometime ago an opportunity to examine, corresponding in its simple upper molars with the dentition of that species. The chief points then for our Scotch naturalists to pay attention to, are, 1st, Whether our great seal is the *Ph. barbata* or *Hal. gryphus*: and 2dly, whether the small animal indicated in the preceding article is actually a distinct species. —J. W.

REVIEWS AND CRITICAL ANALYSIS.

- I.—*Dr Lardner's Cabinet Cyclopædia. Natural History.* 1. *On the Geography and Classification of Animals.* By W. SWAINSON, Esq.—2. *Classification of Quadrupeds.* By W. SWAINSON, Esq. 12mo. London, Longman & Co. 1836.

IN no department of science has a greater or more decided advance and improvement taken place than in that of Zoology. We speak more particularly of what has occurred in our own country, and, we may add, within our own recollection. This, we think, must be admitted and apparent to whoever looks with an unprejudiced eye at the imposing and lofty station it now occupies as a science, and the mode in which the investigation of it is conducted, as compared with its state some fifteen or twenty years ago, when languishing under the trammels of artificial system, and pursued on principles neither philosophic nor in consonance with nature. It is no longer,—Mr Swainson observes,—and we rejoice he thinks himself justified in making the observation, “It is no longer a study of names or of crude technicalities, but, like all other branches of physical science, is become the subject of philosophical investigation, and capable in all its details of similar proof, by inductive and analogical reasoning.” For this improved state of our favourite science we are principally indebted,—and with pride we make the assertion,—to the labours and philosophic views of British naturalists; for though we are willing and anxious to give our due tribute of praise and grateful acknowledgments to Continental zoologists for their researches and discoveries, and are even inclined to believe that the “*Règne Animal*” of the illustrious Cuvier, although that work may have failed in its professed object, the classification of the various objects of the animal kingdom according to their organization, if it did not actually first give the proper direction to zoological investigation, at least

essentially contributed to do so, still we assert that the discovery of the great principles or laws of the natural system originated with, and emanated from, a British naturalist." It is to the enlightened author of the philosophic pages of the "*Horæ Entomologicæ*," that we owe the first announcement and demonstration of the circular disposition of affinities in natural groups, and of every such group being constituted of a certain or definite number. He also obtained the first perception of the theory of representation or symbolical resemblance, though he then supposed it partial, and was not aware of that universal application to which the researches of Mr Swainson shews it to be entitled; he also clearly pointed out the proper distinctions between relations of affinity and those of analogy, which had previously been confounded together, and proved what had only been hinted or glanced at by Lamarck, viz. that the series of affinities is not simple or linear, but of a complex and branching nature. These discoveries, of such importance to zoological science, and first promulgated in this masterly treatise, though rejected as innovations, or rather refused to be entertained by the bigoted adherents of artificial or nomenclatural system, were speedily embraced, to a greater or less extent, by several of the most eminent and rising naturalists of the day; and it was not long before the ornithological department of the science was subjected to the test of the M'Leayan theory. This was performed by Mr Vigors in his valuable essay upon the "Natural Affinities which connect the Orders and Families of Birds," in which the circular and quinary disposition of that class is ably and satisfactorily shewn to exist in its primary groups. But among the early followers and disciples of Mr M'Leay, no one entered the field of investigation with greater ardour, or has carried out his principles to such an extent, or so satisfactory a result, as the gifted author of the volumes now before us. Mr Swainson, we are of opinion, and in this opinion we are confirmed by the result of our own investigations, has, in the works he has already published, not only satisfactorily proved and substantiated the truth of the principles announced by Mr M'Leay, but has, moreover, discovered others of nearly equal importance, the result of analytical examination, supported and confirmed by the strict rules of inductive and analogical reasoning. After many years of incessant study, and the most searching investigation of the subject, with a reputation deservedly high, and which places him among the first zoologists of the age, he now appears before the public as the expositor of the true principles of zoological science, as the author, in fact, of a new *Règne Animal*, founded and arranged on the real affinities of the

beings of which it is composed, and governed by certain laws of general and universal application. How far he is likely, eventually, to succeed in an undertaking so vast and comprehensive, we can only at present form a conjecture from the contents of the volumes already published. A careful perusal of these, assisted by our own studies, strongly incline us to think that signal success will crown his efforts; that he will succeed in establishing throughout the remainder of the animal kingdom, the same first principles of natural arrangement, which we are of opinion he has clearly shewn to exist in the chief departments of the Vertebrata; that he will rise from the completion of his task with an accession of fame to the high reputation he already enjoys, leaving to future zoologists a legacy of inestimable value, as teaching the true path towards the attainment of a perfect knowledge of the science. But even should he fail, or it were possible that the principles upon which the system is based, hereafter should be found incorrect or at variance with nature, still we hold that zoology must be benefited by Mr Swainson's labours; inasmuch, as an investigation as deep and extensive, and conducted upon principles equally philosophic, must necessarily be instituted and pursued before such an event could possibly be effected, no other mode of treating the subject can affect the conclusions at which he has arrived. We are aware that many, on a first or cursory perusal of these volumes, will be impressed with the idea, that the system is one involved in difficulties, and not to be mastered without great labour and deep study,—such we may expect to be the feeling of those who have but first commenced the study, as well as of all the adherents of artificial systems. We do acknowledge that the acquirement of the one is easier than that of the other, the artificial system requiring little mental exertion, beyond a power of discriminating differences and a memory for names; the natural, the full scope and employment of the intellectual and reasoning faculties; but who would not prefer the more difficult path to that of easier access, where the ultimate aim of the first so far surpasses that of the second, the artificial system, at best, being but an index to nature, the other explaining the laws and regulations which govern and guide her; the first teaches only the discrimination of a species, the latter stops not on this threshold, but proceeds to shew the precise station such a species occupies in the scale of being, the affinities it possesses to others, and the analogies by which it is related and represented. We may also expect the law of representation, so prominently brought forward by Mr Swainson, will, from its mere novelty, meet with opposition, and be deemed fanci-

ful, or at least carried to what may be considered, if not a ridiculous, at least an unwarrantable extent. Such an opinion, indeed, we have already heard broached more than once ; but a theory substantiated by a long and painful course of investigation is not to be repudiated and condemned, unless it can be proved, by an examination as strict as that to which it has been subjected, that it is founded in error and unsupported by facts. We allow that many of the analogies or symbolical resemblances instanced by Mr Swainson, particularly when they relate to groups or individuals far removed, are, unless tested by analysis, often difficult to be recognized or perceived ; but this is only what ought reasonably to be expected from the very nature of the subject, as such resemblances cannot be supposed so strong, or so easily perceptible in objects far removed from each other, as in propinquant groups. There are many who would at once allow and recognize an analogy between the eagle and the lion, who would yet dispute its existence in the case of the woodcock and the rat, (strikingly as it may be illustrated in the characteristic wood-cut at page 17, Vol. i. Birds), but it only requires an examination and analysis of intervening groups and forms to be as firmly persuaded of the correctness of the one as of the other. It is moreover a law, we think beautifully illustrative of the " wisdom of God as displayed in the Creation," and strongly corroborative of that unity of design which we can scarcely doubt prevails throughout all the works of the Creator, and which, in a late admirable treatise, is shown to have existed at least in Zoology, from the earliest epochs of the globe we now inhabit.

From what we have already said, our readers must be aware that we are followers of what is frequently termed the circular system, and believers in the principles or laws upon which it reposes. We have long been so, from a conviction that it is the natural system or true mode of investigating animal life,—a conviction, however, we must repeat, not merely drawn from or resting upon the writings and dicta of others, but the result of a long and patient examination of the subject. We therefore agree with Mr Swainson in the great principles he advocates, though we may occasionally differ or require further proof in regard to minute details. In addition to the profound and intimate knowledge of his subject, practical as well as theoretical, the author brings to his task the aid of a powerful and original mind, capable of the most extensive generalization, as well as of entering into minute and laborious detail. The arrangement of the volumes is, we think, upon the whole, good, and

embraces every matter of importance connected with, or bearing upon, the subject ; the style is free and copious, at the same time perspicuous and clear ; and where the subject requires it, numerous and beautiful illustrations from the pencil of the author are introduced, by well executed wood-cuts, which will be of essential service to the student, in assisting him fully to comprehend what it is often difficult or almost impossible to convey by mere verbal description. In giving, however, our meed of praise to the enlightened author of a work, which must ultimately be of great importance in the pursuit and attainment of zoological science, we must not overlook or pass in silence what we consider to be failings, deserving at least of notice, if not of reproof ; we allude to a *spirit of detraction*, or at least an unwillingness to do full justice to the merits of others, which we think is visible in many cases. That of the great and immortal Cuvier may be particularized as one, and an overweening opinion of self is so constantly brought forward and forced upon the notice of his readers, that, in our case, at least, it proved a bar to the otherwise unmixed satisfaction and pleasure we should have felt in perusing these philosophic volumes.

We shall now proceed to examine these volumes in detail, giving, where we deem it requisite, our opinion of their contents, as they come under review.

The first part of the work relates to the Geography of Animals ; a subject deeply interesting to the naturalist, and which we think the author has successfully treated,—his hypothesis being founded on philosophical principles, and, so far as we can ascertain, in accordance with facts. After a few apt introductory observations upon the varieties or races of Man, which he shows cannot be attributed to any of the secondary causes assigned or conjectured by those who have speculated upon the question, he next proceeds to show that the primary distribution of the animal world is involved in difficulties of a similar nature ; the theories of the most eminent authors being all alike unsatisfactory and inconclusive ; he therefore comes to the conclusion, that “ the primary causes which have led to different regions of the earth being peopled by different races of animals, and the laws by which their dispersion is regulated, must be for ever hid from human research.” This, however, does not debar an inquiry into what, he adds, “ experience teaches is a fact,” viz. that certain divisions of the earth are characterized by peculiar animals ; these divisions, therefore, their boundaries, extent, and peculiarities, are the legitimate object of inquiry and investigation. Before announcing his own theory, he takes a review of those of Fabricius,

Latreille, and Dr Pritchard, to all of which he shows there are many and insuperable objections, though he assigns, and we think deservedly, the merit of the nearest approach to a correct theory of animal distribution, due to the last named writer, as it is founded upon the Natural Geography of the Earth. His own hypothesis he prefaces with the following observations:—"Since, then, there is as marked a distinction between animals of the great Continents as there is between the races of mankind, by whom they are inhabited, it remains to be considered whether the general distribution of both are not in unison, whether their divine Creator has not, by certain laws incomprehensible to human understanding, regulated the distribution of man and animals upon the same plan? These questions lead us to the following propositions, 1. That the countries peopled by the five recorded varieties of the human species, are likewise inhabited by different races of animals, blending into each other at their confines. 2. That these regions are the true zoological divisions of the earth. 3. That this progression of animal forms is in unison with the first great law of natural arrangement, viz. the gradual amalgamation of the parts and the circularity of the whole." Assuming, therefore, in accordance with the most distinguished physiologists, that the typical or representative varieties of man are five, viz. the European or Caucasian; 2. the Asiatic or Mongolian; 3. the American; 4. the Ethiopian or African; 5. the Australian or Malay, the respective divisions of the earth inhabited by them will form the five zoological provinces." Their precise limits he does not pretend accurately to define, as an amalgamation or blending in of their contents must necessarily take place upon the confines of each, but the following he considers as a near approximation to the truth. "1. the European or Caucasian range he supposes to include the whole of Europe, properly so called, with part of Asia Minor and the shores of the Mediterranean. 2. The Asiatic range, comprehending the whole of Asia east of the Ural Mountains. 3. The American range united to Europe and Asia at its northern limits; this region comprehends the whole of the New World, but into which it blends at the other extremity is not yet ascertained. 4. In this range he includes the whole of Africa south of the great desert; and the 5th or Australian province embraces the whole of Australia proper, together with New Guinea and the neighbouring islands, as well as those of the Pacific Ocean. The Arctic regions, it will be observed, in this distribution, are not considered as forming a zoological province, and properly so, as the genera and species restricted to them, or which are not found in the temperate parts of

the other continents, are very few ; he therefore contemplates them as the bond of union wherein the three great Faunas of Europe, Asia, and America meet, and are united together." In the five succeeding chapters he enters into a minute and detailed account of the zoological productions of each province, showing the peculiar forms by which they are characterized. This is carefully and ably executed, and indicates the comprehensive and intimate acquaintance the author possesses of his subject. At the end of each chapter, lists of the genera and subgenera of the animals and birds of each province are given, and numerous illustrations, beautifully drawn and executed, taken from the various departments of the science, bring forcibly before the reader the forms peculiar to and characteristic of each geographical division. In conclusion, he adds, " we consider that the facts now stated are sufficiently strong to establish the propositions with which this investigation was commenced. We have seen 1st, that animals are distributed upon a plan sufficiently obvious in its leading outlines to be comprehended and defined ; and 2d, that this plan is found to harmonize in many remarkable ways, with that circular disposition, which is the first law of natural classification."

The rise and progress of Systematic Zoology occupies the second portion of the volume, the first chapter of which, after some preliminary observations upon the terms, system, and method, which, although by some considered as conveying a different signification, he shows must be taken as synonymous, is chiefly occupied in tracing the distinction between an artificial and a natural system, and the essential requisites which must belong to the latter. The whole of this chapter possesses great interest, and requires an attentive perusal. In the next an exposition of a few of the principal artificial systems is given, comprising those of Aristotle, Willughby, Linnæus, and Cuvier ; of the two last as embracing the whole of the animal kingdom from the highest to the lowest groups, he enters into a detailed and minute examination, and, upon the whole, we consider his estimate of the merits of these systems correctly drawn, agreeing with him, that, as an artificial system, the Linnæan is best calculated, from the simplicity of its arrangement and the precision of its nomenclature, to effect the object it had in view, viz. the easy discrimination of a species without further reference to its station in the scale of being, or the analogies by which it is represented. We do not, however, think that ample justice has been done to the labours of Cuvier, for, though the *Règne Animal* has not proved to be a natural arrangement, and as an artificial one it may in some re-

spects be inferior to that of Linnaeus, still its comprehensive and philosophic views, we consider, gave that direction to the study of Zoology which paved the way to the discovery of those principles upon which the natural system is based. Of partial systems, or such as are confined to particular classes of animals, that of Temminck in ornithology is justly considered the best ; his primary divisions, though forced and unnatural, and amounting to as many as sixteen in number, being clear, and therefore easily comprehended, and his genera, though few, well and carefully defined. The other ornithological systems noticed are those of Illiger, Vieillot, and Lesson, the peculiar features of which respectively come under the author's review. Of systems restricted to entomology, those of De Geer, Fabricius, Latreille, Clairville, and Leach, are particularly mentioned, and are accompanied by tables containing their divisions of the class. The chapter concludes with a few apposite observations on Binary or Dichotomous systems, which he shows to be not only among the most artificial of all arrangements, but as even incompetent to answer the purpose of a mere index to genera and species. From artificial, the author in the next chapter passes to the consideration of natural systems, or those " which endeavour to explain the multifarious relations which one object bears to another, not simply in their direct affinity, but in their more remote relations, whereby they typify or represent other objects totally distinct in structure and organization from themselves by certain general laws." After noticing Hermann's work, the *Tabula Affinitatum Animalium*, and Lamarck's System of the Soft or Molluscous Animals, in which that eminent naturalist caught a glimpse of the first great principle of natural arrangement, by discovering that the animal series was of a complex and branching nature, and not simple or linear, as had been previously supposed, he passes to the circular theory of Mr M'Leay, as developed in the *Horæ Entomologicæ* of that enlightened author, in which the fundamental principles of the natural system were first made public. Of this important treatise, the origin and foundation of a new and better school of Zoology, which is fast attaining a degree of perfection that could never have been acquired under any former system, he gives a detailed exposition, rendered the more necessary from the extreme rarity of the work in question, whose philosophic pages, few students can now hope to have an opportunity of consulting. This exposition he concludes with some important remarks, which, that they may not lose their effect, we give in the words of the author. " We have been

induced to devote more space to the developement of the leading principles of this system, than we should otherwise have done, on many important accounts. *First*, Because it is unquestionably the first which clearly defined any one philosophic principle of classification, so that, strictly speaking, we must date the first partial developement of natural arrangement from the publication of the *Horæ Entomologicæ*. Lamarck, it is true, traced the outlines of the circle without knowing that he had done so ; while Mr M'Leay, by a totally different process of investigation, arrived at the same general result, but with this difference ;—that he discovered properties which belonged to this series of universal prevalence in natural groups, and he determined several of those laws which regulated the variation of animals ; a process of induction which heretofore had never been dreamed of. These discoveries let in a flood of light on the study of nature, and converted that which had been a science of observation into one of the deepest philosophy."—The *Systema Mycologicum* of M. Fries is afterwards noticed, which is based upon the three great principles of natural classification announced a little previously by Mr M'Leay, but of which fact this eminent botanist was altogether ignorant when he made the same discoveries during his investigation of a group of the vegetable kingdom. The only point of difference between them is in the determinate number of their groups, those of M'Leay being five, while those of M. Fries are apparently four, we say only apparently, for they are in reality five, as he confesses that his *centrum* or typical group is always divisible into two series. Modifications which Mr M'Leay made in his system are afterwards noticed, as well as the views of other writers in regard to natural arrangement ; and the chapter concludes with some general remarks which may, we hope, prevent in future any of those deviations from the true principles upon which the circular theory is established, and which can only tend to bring it into disrepute. Having taken a review of the various systems, artificial as well as natural, which have appeared, he proceeds, in the third part of the volume, to lay before his readers the result of his own researches on the first principles of the natural system, which are embodied in the following five propositions :—

1. That every natural series of beings, in its progress from a given point, either actually returns, or evinces a tendency to return again to that point, thereby forming a circle.

2. The primary circular divisions of every group are three actually, or five apparently.

3. The contents of such a circular group are symbolically (or analogically) represented by the contents of all other circles in the animal kingdom.

4. That these primary divisions of every group are characterized by definite peculiarities of form, structure, and economy, which, under diversified modifications, are uniform throughout the animal kingdom, and are therefore to be regarded as the *primary types of nature*.

5. That the different ranks or degrees of circular groups exhibited in the animal kingdom are nine in number, each being involved within the other.

These he proceeds to establish by interesting details, and which, so far as we have had an opportunity of examining, tend to substantiate their truth and universality as general laws. In regard to the first, it is almost unnecessary to say we have long considered it as fully established, not only by the arguments advanced by its discoverer, but by the subsequent severe analytical examination it has undergone. As to the second proposition, it is, we believe, likely to prove correct, being in accordance with the first division of natural bodies, animals, vegetables, and minerals, but we think a further investigation, particularly of the lower tribes of animals, is required, before it can be fully established as a general law. Should, however, the three divisions of the aberrant group be found invariably to form a circle of their own, then we must consider them only as one, though always divisible, or made up of three secondary circles, representing the Rasorial, Grallatorial, and Natatorial types; this law, however, of an actual trinary, instead of a quinary disposition, does not affect the natural series by which they are united; for, as Mr Swainson justly observes, "the discovery of the union of Mr M'Leay's three aberrant groups into a circle of their own is the addition only of a new property superadded to that which they were known to possess, this property consisting of uniting into a circle of themselves, as well as passing into the typical and subtypical groups." The third proposition, on the law of representation, which there is every reason to believe is of universal and not of partial application, is ably treated, and only requires to be further tested and investigated in the lower departments of zoology, to be admitted as another general law. In the succeeding chapter he enters into a detailed exposition of the fourth proposition, in which the primary types are pointed out. The fifth and last proposition is rested upon facts and observations,

many of which are already satisfactorily proved, and before the public ; and which show, that although all natural groups are circles, yet these circles are of different sizes, rank, and value, “ therefore require particular names, that their comparative value may be understood, and that they may become efficient instruments of reasoning.” He then adverts to and refutes the assertion that species are the only divisions in nature, as they are found as much and as intimately connected among themselves as genera. The ranks and gradations of circular groups are found to be nine in number, and their names, indicative of their relative value, are as follows: 1. Kingdom ; 2. Subkingdom ; 3. Class ; 4. Order ; 5. Tribe ; 6. Family ; 7. Subfamily ; 8. Genus ; 9. Subgenus, which is the lowest description of group yet discovered. For ourselves, we should have preferred the name *Genus* for the lowest group, giving that to which it is now applied another designation, say that of *Domus* ; but as the term Subgenus has already received the sanction of the public, we cannot venture to urge any further alteration. In confirmation of the universality of these groups, examples of series from various departments of zoology are given, each of which it appears are the result of a strict analytical investigation by the author. Directions are afterwards given for the discrimination of species, in which he dwells upon the principal distinctions of form, sculpture, and colour ; the mode of verifying a natural group is stated, by “ ascertaining the circular series of its contents, the parallel relation of its parts to other groups, and the symbolical representation of the primary types of nature.” This part of the subject he illustrates by the familiar example of the hedge-sparrow (*Accentor modularis*,) whose analogies and station are further exemplified by appropriate diagrams. The concluding portion of the volume professes to be a “ familiar explanation of the first principles of practical and scientific zoology, with suggestions for a plan of studying the details of each department.” Of this dissertation, particularly addressed to those who have first commenced, or are about to commence, the study of zoology, we may briefly remark, that it contains much valuable matter, and many excellent hints and suggestions, as to the qualifications required, and the course of study to be pursued, in order to gain that insight and knowledge of the system of nature requisite to entitle the student to the name of a *good naturalist*, in the proper and extended acceptation of the term.

We now enter upon the Natural History and Classification of Animals, which forms another volume of Dr Lardner's valuable Cyclo-

pædia. As might be expected, the station of man in the creation, naturally engages the early attention of the author, and we are well pleased to find, as it is so completely in accordance with our own feelings, and the opinion we have long entertained, that he considers him as altogether out of the category. This he does, not only from arguments drawn from the nature of man considered as an intellectual and also a spiritual and immortal being, which shew that his natural affinities place him in a circle of higher intelligences, but from those deduced from analytical investigation and inductive reasoning, evidently proving the impossibility of placing him within the animal circle, even when viewed simply as a zoological form ; the typical circles of the only groups into which he could possibly enter, supposing him to form a part of the animal world, viz. the *Quadrumanæ* of Cuvier, the *Primates* of Linnæus, being shewn in the analysis of that group to be complete and perfect without him. In conclusion he adds, “ We have now shewn that, whether we regard man in his higher or his lower qualities—whether as an immortal or as a material being—the station that has been hitherto assigned to him in the scale of creation is inconsistent both with innate feeling, and with that logical induction upon which all true science reposes ; nor is this the only inference to be drawn from the arguments here employed. Had the essential distinction, or, in technical language, the *specific character* of man not consisted in the immortality of his noblest part, there would have been an immeasurable hiatus between the circles of intelligent and unintelligent beings, which nothing that we can conceive would lessen, even by supplying the slenderest filament which might intimate their connection ; nay more, the higher ranks of intelligence would appear to want that link which was to connect spirit with matter,—corruption with incorruption. If man holds a station in the series of unintelligent beings, he cannot enter into the circle of those that are intelligent, because *no being can occupy a station in two distinct circles.*”

The two kinds of organized matter, animal and vegetable, are next brought under consideration, and, strange as it may seem to those who have never directed their inquiries into subjects of this nature, it evidently appears, from the researches of the most eminent naturalists and physiologists, that all attempts rigorously to define either is impossible, as the union or amalgamation of the lower organized forms of each, has been satisfactorily proved. This, however, is only in accordance with what by naturalists is now considered almost in the light of an axiom, viz. that no abrupt or absolute divisions exist

or can be detected in the great groups of nature. The definitions, therefore, that have been given of the distinctive characters of a vegetable and an animal, can only relate to the differences between the typical forms of each. "On this head," Mr Swainson observes, "we can add nothing to the definitions given by Linnæus, Cuvier, &c. or to the acute reasonings of Mr M'Leay, premising only, that the value of every character that can possibly be devised, will progressively be deteriorated, and finally lost, as we recede from the circle of vertebrated animals, and approach the confines of the vegetable kingdom." After giving a tabular view of the probable number of existing species of animals, which he calculates at near 600,000, an estimate we believe below, rather than above, the actual amount, he indulges in the following reflections, which are so appropriate, that we make no apology for quoting them at length. "It is then, with such vast hosts of diversified beings that the naturalist has to treat. These are his materials of study and contemplation, and these he is to examine, and, in some measure, to understand, before he can obtain a glimpse of the plan upon which they have been created. But, however overwhelming to the mind this number, viewed abstractedly, may appear, it loses much of its formidable character, when we perceive that nature herself has divided and subdivided it into larger and smaller assemblages; and that through all, and between all, there is a degree of order and of harmony which enables the mind to contemplate and investigate one portion, without the absolute necessity of grasping at the universal knowledge of all. This order and consistency in the creation, is productive of another advantage: it not only enables us to form correct notions on the leading peculiarities of large groups, without venturing upon the Herculean, or rather endless task of analysing the properties of every species, but it likewise gives us the power of forming just comparisons, by contrasting any one of these groups with others." Again, "the truth seems to be, that the primary types of nature are very few, but that the variation of these types sometimes appears to be all but infinite. Thus no one can mistake a bird for a quadruped, or this again for a fish; one individual from each of these classes is quite sufficient to give us a correct and definite idea of the rest; and yet we have reason to believe, that the form of a bird can be varied without the least departure from its characteristic structure in more than six thousand different ways! The typical form of a fish admits probably of eight thousand variations. But these are nothing when we come to annulose animals. The most ordinary observer, if he sees a "creeping

thing" walking upon legs, pronounces it, and justly, to be an insect ; and yet such is the wonderful and almost inconceivable variety that nature has lavished upon this class, that it is highly probable the aspect of an insect admits of half a million of variations, without such a departure from the great outlines of the original type, as would prevent any one variation from being confounded with a bird, a fish, or a quadruped."

He afterwards passes to the consideration of the primary divisions of the animal kingdom, as proposed by MM. Cuvier, Lamarck, and Virey. Preferring that of the latter, as being most in consonance with nature, he therefore adopts the *Vertebrata*, the *Annulosa*, and the *Mollusca*, as the three primary circles of the animal kingdom, the two first forming the typical and subtypical groups, the latter the aberrant, composed of the three minor circles of the *Mollusca testacea*, Testaceous Mollusca, the *Acrita* or Polypes, and the *Radiata* or radiated mollusca. The peculiar characters of each division are also detailed, as well as the manner pointed out, in which they blend the one into the other, so as to constitute one great circle, composed of the *Acrita*, *Mollusca*, *Vertebrata*, *Annulosa*, and *Radiata*.

The Mammalia, as being the most complicated in their organization, as well as the most perfect in their senses, he naturally places at the head of the vertebrata, and their more obvious characters are defined, as, Female suckling her young ; body covered with hair or fur ; possessing four legs ; warm blood ; and living upon the ground. Not one of these characters, however, is perfectly absolute, but, taken collectively, they are sufficient to discriminate a quadruped from all other animals at present in existence. Birds (*Aves*) follow next in rank to quadrupeds, having an organization less complicated, and an inferior degree of intelligence. They are characterized by having only two legs, corresponding to the hinder pair in mammalia, the anterior being represented by the wings. The body is clothed with feathers, the blood warm, and the young are produced from eggs hatched by the parent.

The third great division, composed of the circles, Reptilia, Amphibia, and Pisces, contains animals much inferior in organization and intelligence to the two former, and peculiarly distinguished by having cold blood, and a body either entirely naked, or covered with scales, besides the negative characters of neither suckling their young like quadrupeds, or flying in the air like birds. These are the characters possessed by the aberrant group as a whole, and which distinguish it from the quadrupeds and birds ; but as it is

composed of three minor circles, each of these in addition possesses distinctions of its own. The analogies of the Vertebrata to the primary divisions of the Animal Kingdom are then glanced at, and they appear to stand thus.

Mammalia,	-	Vertebrata,
Aves,	-	Annulosa,
Pisces,	-	Radiata,
Amphibia,	-	Acrita,
Reptilia,	-	Mollusca testacea.

The characters he selects for the arrangement of the Mammalia, in their primary circles, are the feet and the teeth, as being parts readily seen and easily understood, and as having a direct influence upon their peculiar economy ; the first being remarkable as the organ of motion, the latter as indicating the nature and quality of the food upon which they subsist. We cannot, however, agree with Mr Swainson in thinking, that the internal structure and comparative anatomy of animals belong more properly to the province of the physiologist than that of the naturalist, for although external characters alone may in general be sufficient for the purpose of indicating natural groups, we consider them to be so intimately connected with internal peculiarities of organism, that to understand and appreciate the value of the one requires the study and knowledge of the others ; in fact, that no one is entitled to the name of a naturalist, who limits his observations and researches to the mere external aspect of the beings with which he is engaged.

The primary types of the Mammalia he considers to be, 1st, The *Quadrumana*, defined as possessing the three sorts of teeth, viz. incisors, canines, and molars ; the extremities of the four limbs performing the office of hands, one of the toes being opposable to the others, and acting as the thumb. 2d, *Feræ*, also with the three sorts of teeth, but the canines very large, the thumb or fifth toe placed on the same plane with the others, the claws often retractile. The aberrant group, or the three aberrant circles, as they have not yet been proved to constitute a circle within themselves, are distinguished by their imperfect and variable dentition the under jaw being generally without the canine teeth. These groups are known by the names of the *Ungulata*, *Glires*, and *Cetaceæ*. The analogies of the orders of the Mammalia to those of the class Aves, are considered to stand thus,—

Quadrumana,	-	Insessores,
Feræ,	-	Raptores,

Cetaceæ,	-	Natatores,
Glires,	-	Grallatores,
Ungulata,	-	Rasores.

A position, it will be observed, in regard to the Glires and Ungulata, different from that assigned to them by Mr M^cLeay, but which we consider as more in consonance with the true analogies of the groups, and supported by a more extended analytical investigation of their contents. According to our author, the quadrumanous order is composed of the following families or primary divisions; 1st, The *Simiadæ*, or Apes and Monkeys of the Ancient World; 2d, The *Cebidæ* or those of the New World, constituting the typical and subtypical groups; 3d, The *Lemuridæ*, or Lemurs; and 4th, the *Vespertilionidæ* or Bats, properly, we think, transferred to this order, (the station first assigned them by Linnæus), from that of the Feræ, in which they were placed by Cuvier. These form two of the aberrant divisions; the third, which ought to represent the aquatic type, is wanting, or has not yet been discovered. He then enters into an interesting detail and analysis of the first group, *Simiadæ*, showing that the circle is perfect and complete, even following the arrangement of the family according to the analysis of MM. Cuvier and Geoffroy St Hilaire, from whence he deduces the important inference, that Man, considered merely as a reasoning biped animal, cannot enter into the circle of this, the typical family of the *Quadrumana*, much less into that of any other division of the order. The *Cebidæ*, or monkeys of the New World, which constitute the subtypical group, are distinguished by their inferior size, and the universal appendage of a tail, which member in the typical groups is long and prehensile. The wide space or septum between the nostrils is also a strong mark of discrimination, and they are besides destitute of cheek-pouches and callosities. The five typical forms of this family are represented by the genera *Mycetes*, *Cebus*, *Callithrix*, *Hapales*, and *Pithecia*, and the passage from the *Cebidæ* to the next family or *Lemuridæ*, is effected by the intervention of the *Aotus trivirgatus*, Humb. an animal possessing characters almost intermediate between them. The genus *Lemur*, distinguished by the long and ornamented tails, and the frugivorous habits of its members, he considers the typical group, assigning the subtypical station to the genus *Otolictnus*, Ill. the members of which, in their general habits, are carnivorous. The aberrant groups are supposed to be represented by the genera *Aotus*, Ill. *Cheirogaleus*, Geoff., and *Galeopithecus*, Pall., which last, from its flying membranes, or the

loose naked shin that connects the limbs, and supports them in their leaps from tree to tree, as well as their nocturnal habits, and insect-food, lead directly to the *Vespertilionidæ* or bats, the most aberrant family of the order, and constituting its suctorial type. His observations on the arrangement of this division are very short, and he adopts without any change the types of the sub-families, as pointed out by Mr Gray, viz *Rhinolophinæ*, *Phyllostominæ*, *Pteropinæ*, *Nocilioninæ*, and *Vespertilioninæ*.

The Feræ or rapacious order, the subtypical division of the Mammalia follows next in succession, but of this and the remaining orders, he does not profess to enter into a minute analysis of the minor groups, or the location of the genera in their natural series, which would require more space than the nature of the work permits, and more labour than he has been able to bestow upon them; he therefore contents himself with pointing out what he considers to be the primary types and divisions of each, and the mode in which the different circles are connected with each other. The five groups of the Feræ are the *Felidæ* and *Mustelidæ*, the *Didelphidæ*, *Sorecidæ*, and *Phocidæ*; the two first forming the typical and subtypical families, the three latter the aberrant. He commences his notice of them, with the *Didelphidæ* or Opossum family, by which on one side the ferine order is immediately connected with the *Quadrumana*, while it leads by the genera *Cladobates*, or that of *Gymnura*, Raffles, to the *Sorecidæ*, and to the *Mustelidæ*, in all probability by the genus *Arctitis*. Besides the genus *Didelphis*, restricted to the American marsupiate opossums, and the group of which *Did. dorsigera* is the representative, it contains the *Dasyuri* or brush-tailed opossums of Australia, &c. The passage from this family to the *Sorecidæ*, which corresponds without variation to the Insectivora of Cuvier, is effected by the *Gymnura Rafflesii*, an animal bearing a near affinity to the *Cladobates* or *Tupaia* of Raffles. Of this family, the shrew mice, genus *Sorex*, are considered the typical representatives; among its members may be enumerated the hedgehogs (*Erinaceus*), the moles (*talpa*), and other animals nearly related to them, and belonging to the genera *Scalops*, *Chrysochloros*, *Centenes*, &c.

The *Phocidæ* (Seals), the last of the aberrant groups, and constituting the aquatic division of the order, stands at present almost isolated from the foregoing families, and, as Mr Swainson observes, almost equally disconnected with the typical *Felidæ*. This, however, we must suppose, arises from our ignorance or non-discovery

of the intermediate forms necessary to show their connection ; as there can be no doubt, from their dentition and carnivorous habits, that these animals strictly belong to the Ferine order, and, as the aquatic type must be followed by the typical group of the *Felidæ*.

The seals, generally so called, whose natural history has hitherto been much neglected, and the Morse or Walrus, are the only divisions at present recognized. These animals, by their affinity to the Dugongs, shew in what way the union of the Ferine order with the *Cetaceæ* is effected.

The *Felidæ* or typical division of the rapacious animals comes next under review. Of this family, as well as of the entire order, the group including the lion, tiger, panther, and other cat-like animals, is justly considered pre-eminently typical, and is designated as the sub-family *Felinæ*. By the genus *Cynailurus* (hunting-leopard), they pass into the next group composed of the hyænas, whose union with the dogs (*Caninæ*) is satisfactorily established by means of the *Canis venatica* of Burchell, and the *Lycaon Burchellii* of Brooks. In this latter group is included, not only the true dogs or genus *Canis*, but the wolves, foxes, and the fennecs (*Canis cerda*, Rupp.) As the type of the fifth or aquatic group of the *Felidæ*, he suggests the probability of its being represented by the genus *Thylacinus*, Temm. an animal of Australia, and formerly associated with the opossums, under the name of the dog-faced opossum. Its dentition, however, as well as its form and habits, certainly indicate a much nearer affinity to the *Felidæ* than the *Didelphidæ*, although possessing the marsupial pouch ; and near to it also he would place the *Dasyurus ursinus*, Temm. another large carnivorous marsupiate animal. It must be acknowledged, however, that further observation, and a strict analytical investigation of the various groups, is necessary, before the true station of these animals can be satisfactorily established. The *Mustelidæ* or weasel family, which form the sub-typical division of the order, come next under consideration. They are, he says, for the most part eminently carnivorous and ferocious, yet of small size and slender shape. As they are more numerous than the last family, their forms are more diversified, and we consequently find that some of the aberrant divisions present a striking difference from those which are typical. To the latter, however, we must always direct our first attention, when endeavouring to define the leading characters of a family. The chief groups, therefore, of the *Mustelidæ* are composed of the weasels and the polecats ; these, by various intermediate genera, are connected with the racoons,

badgers, and gluttons; the series finally terminating in the bears, which stand at the furthest confines of the series. After shewing that the plantigrade and the digitigrade divisions of M. Cuvier are indefinite and artificial, he proceeds to enumerate the sub-families or five typical forms of which it is composed. The first mentioned is that represented by the genus *Ryzæna*, an animal in the opinion of many naturalists approaching nearer to the dogs than to any other of this family, except it be the *Cynictis* of Mr Ogilby, an animal recently brought from South Africa, and which that gentleman considers as connecting the Viverrinæ with the dogs. The genets or Viverrinæ, constituting the sub-typical group, contains the genera *Crossarchus*, *Herpestes*, *Genetta*, *Viverra*, and probably *Paradoxurus*. The *Mustelinæ* or typical group are distinguished by their purely carnivorous habits and thirst for blood. In addition to the genera *Mustela*, *Martes*, *Mephitis*, *Mydaus*, &c. the otters also belong to it; and he adds, "it will be a question for future investigation, whether the *Gluttons* (*Gulo*), the *Rattels* (*Ratelus*), and the badgers (*Meles*), form the aberrant portion of the ursine circle, or whether they represent the bears, and enter into the circle of the *Mustelidæ*." The ursine or genuine bears follow next, among which he includes the sloth-bears, *Prochilus*, Ill. and the Balisaur or *Arctonyx collaris*. From these to the racoons the gradation is easy and natural. To this latter group belongs the genus *Nasua*, which shews a decided affinity to the *Ryzæna*, indicating that the *Mustelinæ* form a circle within themselves. Before he passes to the next order, he adverts to the considerations which induced him to separate the carnivorous from the herbivorous Marsupials, and to break up the order Marsupiatæ of M. Cuvier. "Nearly all our leading naturalists have acknowledged the artificial nature of this assemblage, uniting, as it does, animals of the most opposite natures, and of the most dissimilar organization, merely from the circumstance of their possessing a marsupial pouch. Upon what reasons M. Cuvier, by instituting this order, was induced to violate the very first principles of his own arrangement, which every one sees is mainly founded upon the structure of the teeth—we know not; but this single circumstance is sufficient to excite the strongest suspicion, that his arrangement is not natural. This at least, was the conclusion at which we arrived, after the most matured investigation we could give the subject, and after endeavouring in vain to discover a circular series among the marsupial animals." In this view of the subject, he is supported by the weighty opinion of the

late Mr Bennet, who had deeply studied the structure and affinities of the marsupial animals ; and we consider the act alone of breaking up an order so artificial, and the arrangements of its contents more in accordance with their affinities and general organization, an attempt well deserving the thanks of the naturalist.

The notice of the Cetaceæ or aquatic order, as might be expected from our comparative ignorance of the habits of the species, and the paucity of the types discovered, is very brief, and no attempt is made to determine the natural divisions. Its connection with the Feræ is supported by the affinity that the *Phocidæ* evidently show to the Dugongs or herbivorous whales, which latter animals also serve to connect the Cetaceous order with the *Ungulata*, by means of the Hippopotamus ; but no forms have yet been discovered to show in what manner its union with the *Glires* is effected. The *Ungulata* or hoofed order which follows, are known “ by the peculiar construction of their feet, the extremities of which are entirely surrounded or inclosed in a horny covering or sheath, a structure by which they are distinguished from all the other land quadrupeds, whose toes are merely tipped with claws, or protected outwardly by nails. The primary divisions or tribes of this conspicuous group, are, according to our author, the *Solipedes*, of which the horse is typical ; the *Ruminantes*, distinguished by their cloven hoofs and horns ; these two represent the typical and subtypical divisions. The aberrant are the *Anoplotheres*, so named in reference to their fossil type, supposed to be now represented by the tapirs, pigs, &c. The *Pachydermes*, containing the largest existing land animals, as the elephant, rhinoceros, &c. and the *Edentates*, forming the most aberrant division of the order, this group, he remarks, forms a solitary exception to all the preceding, in having distinct toes, and very large nails ; but those nails are unlike those of all other quadrupeds, and M. Cuvier well observes, “ that they approach more or less to the nature of hoofs.” The circular series of these divisions he endeavours to trace in the following manner :—The *Solipedes* pass into the Ruminants by the camel ; the tapirs, which show an intermediate form between the ruminants and the armadilloes, connect the *Anoplotheres* with the *Edentates* ; the Sloths, which belong to the latter, lead directly to the fossil genus *Megatherium*, in the circle of the *Pachydermes*, and the return to the *Solipedes* is supposed to be effected by means of the hippopotamus ; though we confess the affinity seems distant, and that some intermediate forms are wanting to bring these divisions into juxtaposition. After a

few observations upon the genus *Equus*, and showing that the camel group belongs to the circle of the *Solipedes*, and is the connecting medium between it and the *Ruminantes*, he takes a hasty view of the principal forms of the *Pachydermes*, composed of the first section of Cuvier's order Pachydermata; he then passes to the *Edentates*, which differ greatly from each other, both in general appearance, and in the characters of their dentition, but are nevertheless united by some natural relations of a positive nature. The Sloths (*Bradypus*) are noticed as forming one group, the ant-eaters (*Myrmecophaga*,) armadillos *Dasypus*, and *Chlamyphorus* a second, and the *Echidna* and *Ornithorynchus* a third, supposing that these two upon a strict analysis actually belong to this division. He then adverts to the *Anoplotheres*, which he considers entitled to a place among the leading divisions of the Ungulata, from the nature and form of their hoofs and toes. Of these the fossil *Anoplotherium* of M. Cuvier is the type, and as existing forms of this group, he cites, though doubtfully of some, the genera *Sus*, *Tapirus*, *Dicotyles*, and *Phascogærus*.

The chapter concludes with some interesting remarks upon the fossil remains of these and other animals. After some interesting observations upon the structure and form of the Ruminants, and a well deserved tribute of praise to the researches of Major C. Hamilton Smith, whose views in regard to the affinities of the animals belonging to this tribe, our author has generally and closely followed, he states the five families or primary groups of the Ruminants to be, the *Antelopidæ*, *Bovidæ*, *Cervidæ*, *Moschidæ*, and *Camelopardæ*, the two first forming the typical and sub-typical group, the three latter the aberrant. Of each of these divisions, and the minor groups they contain, he gives a summary account, principally taken from the writings of Mr Smith, and at the same time he shows in what manner they are connected and pass into each other. In his observations upon the *Bos Scoticus* or *wild ox*, existing in some of our parks we do not agree, as we consider them merely varieties of the *Bos taurus*, and very nearly akin to the *kyloe*, nor do we think them naturally more savage and untameable than the latter would show themselves if placed in a similar situation, and treated in the same manner. We know, besides, that they breed freely with the common ox, and that the progeny produced from the cross is also productive, and it is a well ascertained fact, that, if taken young, they become as tame as any of the common breed.

The union of the *Solipedes* with the Ruminants he considers is effected by the Giraffe (*Camelopardalis*) whose affinity to the camel is acknowledged by Major Smith, and, as he observes, did not even escape the notice of the ancients. The fifth, and last order, is that of *Glires*, so named by Linnæus, the Rodentia of M. Cuvier. The chief characters of the typical groups, consist in the total absence of canine teeth, and the articulation of the lower jaw being also so constituted as only to admit of a horizontal motion backwards and forwards; but this, as he observes, "is in strict conformity with the mode of eating of all rodent animals, the food being divided by the long incisors, and trituated or ground by the molars. He then enters into and illustrates the analogies of this order with the wading-birds, (*Grallatores*,) bringing into comparison, with great skill, the different points of resemblance between them, many of which are too striking not to carry immediate conviction of their truth, though others, we are aware, are of that distant nature, which require analysis and intimate knowledge of the subject before they can be fully understood or comprehended. We have no hesitation, however, in stating our conviction, that Mr Swainson's theory, in regard to the analogies of this order, is the true one, and that the *Glires* constitute the tenuirostral or Suctorial type, and not the Rasorial, as Mr M'Leay endeavoured to prove in the essay previously adverted to. No attempt is made by the author to point out the five primary groups of this order. He therefore takes a rapid review of M. Cuvier's divisions, under the titles of *Beavers*, *Rats*, *Marmots*, *Squirrels*, *Porcupines*, *Hares*, and *Cavies*, pointing out the peculiarities of the groups, and the forms by which some of them probably pass into each other. He concludes this part of the volume with some further important observations upon the herbivorous marsupials. Upon a review of the characters of the various genera of the herbivorous marsupials, his impression appears to be decidedly in favour of placing them in the circle of the *Glires*, of which order they will probably form an aberrant group, representing the Rasorial type, and if so, then the connection of this order with the *Ungulata* will be effected by the kangaroo, an animal which, in its bulk, habits, and physiognomy, certainly indicates an affinity or resemblance to the deer and other grazing animals. Much, however, must necessarily depend on the result of a strict analysis of this order, which has not yet been attempted, even in respect to its primary groups. Till that is done, hypothesis and conjecture are only likely to lead into error and confusion.

II.—*Suites à Buffon, formant, avec les œuvres de cet auteur un cours complet d'histoire naturelle. Collection accompagnée de planches. Diptères, par M. MACQUART. Tom i. 1834.—Species général des Lepidoptères, par le Dr BOISDUVAL. Tom. i. 1836.*

JUDGING from the volumes which we have had an opportunity of examining, the *Suites à Buffon* promise to form one of the most valuable contributions to natural history that has appeared for a considerable time. The design is an extensive one, and its successful completion will entitle the projectors to the gratitude of all the cultivators of natural science. It embraces a comprehensive view, descriptive and historical, of all the different departments of the animal kingdom which were not adequately treated of by Buffon. As supplementary, therefore, to the works of that eminent writer, this series relates chiefly to the invertebrate animals, the natural history of which was comparatively little understood in his time. It is estimated to extend to about 45 octavo volumes, a considerable number of which have been already published, and the rest are promised at monthly intervals. The authors entrusted with the respective departments have long made them a subject of careful study, and in general are well known to naturalists by works already published in relation to them. In the entomological department, to which for the present we mean to restrict our observations, we find the names of De Jean (*Coleoptera*), Boisduval (*Lepidoptera*), Le Peletier de Saint Fargeau (*Hymenoptera*), Audinet Serville (*Orthoptera*, *Neuroptera* and *Hemiptera*), Lacordaire (*Introduction to Entomology*), and Macquart (*Diptera*), all of whom have already shewn their intimate acquaintance with the different branches they have undertaken to illustrate.

The last named individual first became known in this country by his work on the Dipterous insects of the north of France. This production affords a detailed description of all the species found by the author in the district alluded to, accompanied with a pretty full account of their general history, and generic distinctions. It is not, however, distinguished for originality, comparatively little important information being supplied that is not to be found in Meigen's admirable work on the two-winged insects of Europe, from which in most cases the descriptions have been little more than translated. In one instance, perhaps, he may be admitted to have improved on his model, by taking more particularly into account the neuration of the wings, from which he has been enabled to deduce characters of the greatest importance in the definition of natural groups.

The present work is of a more comprehensive character. Besides describing the species known to be natives of France, as well as such kinds belonging to the adjacent districts as are thought *likely* to occur in that country (of course indicating the latter by a distinctive mark), the types of other European genera are noticed, and an account given of the principal foreign Diptera found in French cabinets, with a view of supplying the deficiencies of Wiedemann's Exotic Diptera. In order to accomplish these various objects within a limited space, the descriptions and general history are very much condensed, but no important fact appears to be omitted. Being now familiar with the subject, the author acts a more independent part, and proposes various new genera, most of them on such judicious grounds that they can scarcely fail to be generally adopted. One of the most valuable parts of the work, and which tends more than any other to facilitate the study, is the synoptical tables of the genera prefixed to each family. Upon the whole, a safer guide than Macquart in the study of this interesting tribe of insects, cannot be obtained, not only on account of his own intrinsic merits, but as being the most recent writer on the subject, and consequently able to avail himself of all that is most valuable in the works of his predecessors; and this he must be admitted to have done with considerable judgment.

The accompanying fasciculi of plates merit the praise of considerable accuracy, and are therefore useful as illustrating the text, but they are executed with little taste, and have scarcely any value as works of art. In the productions of Curtis, Westwood, Swainson, and others, we are now becoming familiar with such elegant delineations of insect forms, that this defect appears more conspicuous than it would have done at a former period. The cheapness of the French plates constitutes their principal recommendation, but even this does not appear incompatible with a more tasteful execution; if it be, no one would refuse to sacrifice something to the graces.

To Dr Boisduval none of our entomological readers require any introduction. He has long since established a claim on their favourable regard by the publication of various valuable papers on insects, particularly that relating to the natural history of those of Madagascar. The lepidopterous tribes especially, have been his favourite study, and in the work cited above, (*viz. Species Général*) we have the fruit of an almost uninterrupted attention to the subject from the time that he

was fifteen years of age.* We doubt not but that it will be admitted by all to bear honourable testimony to his diligence and success. For ourselves we can affirm, that we have not of late often met with a work on natural history conceived in a sounder spirit, and executed with so much judgment and discrimination. Every one who studies this elegant tribe of insects, must have long felt the want of such a publication. No general description of species has appeared since that of Godart, forming a part of the *Encyclopedie Methodique*. That valuable and elaborate production, however, is not adapted to the present state of the science, multitudes of new species having been discovered since it was written, and numerous improvements effected in the mode of arrangement.

The task which Dr Boisduval has undertaken is by no means an easy one. Latreille has somewhere asserted that a good classification of the Lepidoptera is the touchstone of systematists. The difficulty arises from the want of prominent characters. It is easy to distinguish numerous groups by a certain peculiarity of aspect and similarity of design in the colouring, but no sooner is an attempt made to define them in a rigorous manner, than it is found that recourse must be had to characters of very subordinate importance, almost always minute, and of difficult application in practice. This uniformity of organization among the Lepidoptera, results from, or occasions, the uniformity that exists in their mode of taking nourishment. The nectar of flowers and the juices of vegetable matter form their only food. There is no need, therefore, for that variety of structure observable in tribes, (the Coleoptera for example,) which are destined to live on almost every kind of organized substance, from the hardest ligneous tissue to a semifluid animal matter.

The difficulties in the way of a lucid arrangement inherent in the subject, can scarcely be said to have been diminished by the mode in which it has been handled by many modern naturalists. The numerous "Illustrations" of Lepidoptera published of late years have been *partial*, being either selections from the whole class, or forming part of a local Fauna. In either case the subject is regarded in too insulated a light. The illustrator of foreign butterflies selects a species, and by giving prominence to all its minute characters, proposes it with considerable plausibility as a distinct genus. The local faunist divides his groups in reference to his own limited sphere of observation. Neither contemplates the possibility of being ever called upon to elaborate a general system, and he leaves it to those who are to re-

* Preface to *Species Général*.

concile all existing inconsistencies. Hence it follows, that so many of the genera proposed in local and partial works, can find no place in a general one, for, however specious they may look when standing alone, it is often found that they will not unite into a consistent whole, and they may be therefore said still further to embroil the very subject they were designed to illustrate.

In the want of tranchant characters in the perfect insects, Dr Boisduval thinks himself justified in taking into account such as are presented by the caterpillar and chrysalis. This method, to a certain extent, has been often adopted before, and is not objectionable; for although it would be more convenient to derive the characters from the butterflies in order to facilitate the identification of species, it cannot be denied that their individuality is the same in all forms. His genera are sufficiently numerous, but he appears to have established or adopted none but such as were indispensable. We have no doubt but that he will be blamed by some for not subdividing with a less sparing hand. His genus *Papilio* has quite a Linnæan aspect, comprising 224 species: *Pieris* contains 166, and *Terias* 53. These great genera are divided into groups, founded on the form of the caterpillar, the pictorial design and shape of the wings, the *facies*, and finally the native country of the insect. These groups, however, are given without characters, on the plea that they are too minute; an omission which greatly impairs their value.

Our author divides the order *Lepidoptera* into two grand *Legions*, which he names *RHOPALOCERES*, having club-shaped antennæ, and *HETEROCERES*, with variable antennæ. The former, which corresponds to what we are accustomed to call *Lepidoptera diurna*, he divides into three *sections*, in consequence of the manner in which the chrysalis is secured; 1st, *Succincti*, having the chrysalis attached by the tail and a band round the middle; 2d, *Suspensi*, chrysalis suspended by the tail only; 3d, *Involuti*, chrysalis enclosed in a cocoon. The first of these sections contains the *tribes*, *Papillonides*, *Pierides*, *Eumenides*, *Lycenides*, *Erycinides*, *Peridromides*; the second, *Danaiides*, *Heliconides*, *Nymphalides*, *Brassolides*, *Morphides*, *Satyrides*, *Biblidides*, *Libythides*; the third, the *Hesperides*.

As in most arrangements, the great genus *Papilio* commences the series, or rather the group named *Ornithoptera*, which includes several of the largest and most conspicuous kinds formerly referred to *Papilio*. The type of this new genus is the magnificent *P. Priamus*, which, with its associates, are all natives of the great islands in the Indian Archipelago. As an example of the valuable information sup-

plied by this work, we may refer to the account of *Papilio Memnon*, under which our author proves that no fewer than six or seven kinds, hitherto regarded as distinct, are mere varieties of that protean insect. The descriptions are of considerable length, and formed on the model of Godart's, whose exact words in many cases the author very properly adopts. In conformity with the plan followed in the whole series, no concise specific characters are given, which will probably be found to be an inconvenience. The present volume extends to the genus *Terias*, and it may be estimated that nearly three other similar volumes will be requisite to complete the Diurnal Lepidoptera alone, on the same ample and satisfactory plan. The plates illustrating this volume are engraved with great care, and form a valuable accompaniment to the text.

BIBLIOGRAPHICAL NOTICES.

A Synopsis of the Birds of Australia and the adjacent Islands. By JOHN GOULD, F. L. S., &c. Part I. Royal 8vo. 1837.

Mr Gould thus expresses himself in the prospectus to this work: "The author trusts that the present work will not be deemed uncalled for; more especially as not only are we less acquainted with the natural forms inhabiting this portion of the globe, differing, as they do, so widely from all others, whether belonging to the old or new world. The author, therefore, conceives, that a work on the birds of these countries cannot fail to be of the greatest interest, not only to the naturalist and scientific men of our own country, but to those of Europe and America, as well as to the inhabitants themselves of these distant colonies; and he is farther induced to commence such an undertaking, having at this moment in his possession an exceedingly rich collection, perhaps the finest extant, of the productions of these countries, among which are a large number of undescribed species."

"The object of the present publication is, in the first instance, to make known, and record in an eligible form, the best accessions which science has latterly acquired from this portion of the globe; and, in order to render it of real value and utility to the men of science of all countries, the author has determined upon giving, besides a Latin and English description, measurements, synonyms, &c. a figure of the head of the natural size of every species, a feature not to be found in preceding works of a similar nature, and by which each bird may at once be distinguished, hitherto a matter of some difficulty, particularly in those that are nearly allied. The work will be published in parts, each of which will contain eighteen plates,

with letter-press descriptions.—The price of the work is L. 1, 5s. coloured ; 15s. uncoloured ; and the letter-press may be had separately for 5s. Full generic characters will be given at or near the close of the work, and a short history of the various groups and their affinities, with what has been ascertained of the habits of the birds, will be added."

The above extracts will give an idea of the plan and objects of Mr Gould's new work. The plates (lithographs) are beautifully and spiritedly executed, and the descriptions are compact and accurate. But having thus expressed our high opinion of the work, we have to regret the want of condensation which we like to see, and understand should be contained in a synopsis ; while the introduction of the characters of the *new genera*, even though they should have to be repeated at the close of the volume, would have been of great advantage to the student. We nevertheless recommend this book as a synopsis beautifully illustrated.

Among the more remarkable forms noticed are *Calodera*, Gould, a genus very properly formed from the bird figured in Ornithological Illustrations by Sir W. Jardine and Mr Selby under the title of *Plilonorhynchus nuchalis*, remarkable for the beautiful ruff of satiny feathers which adorns the nape. Mr Gould has also been so fortunate as to procure what he considers a second species, which he has named *C. maculata*, adorned also with a somewhat similar nuchal ruff. *Struthidea* is a curious form ; and *Neomorpha*, inhabiting New Zealand, two species, is very remarkable ; the genus seems allied to *Promerops*, and has the corners of the mouth supplied with large rounded yellow wattles. A second species of *Nestor* is characterized under the title *N. productus*, and has the bill extremely developed. A new genus is proposed, having for its type *Meliphaga lunulata*, *Hæmatops*, Gould ; but this, we believe, has been previously named and characterized by Mr Swainson, under the title *Gymnophrys*. Two species of *Zosterops*, from the interior of New South Wales, are noticed in addition to the well-known *Z. dorsalis*.

Birds of Europe. By JOHN GOULD, F. L. S. London, Folio.

Parts 20 and 21 of this fine work are nearly completed, and will appear together. These numbers were expected to have contained all the European birds, but it has been found that another (Part 22,) will still be necessary. In this some extremely rare birds will be figured, such as *Accentor montanellus*, *Caprimulgus ruficollis*, *Sylvia sericea*, and *lucinioides*, &c. ; specimens of which have been forwarded to Mr Gould by the Directors of the Imperial Cabinet of Vienna, while the curators of the museums at Leyden and Berlin, are acting

with the same liberality in respect to the rare, sometimes unique specimens, which these collections possess.

Illustrations of Ornithology. By Sir W. JARDINE, and P. J. SELBY, (New Series.) No. I. Edinburgh, Lizars, 1837. 4to. and imp. 4to.

The first Number of this "New Series of Ornithological Plates" is published, and contains figures of *Pernis apivorus*, *Hypsipetes Ganessa*, *Brachypus eutilotus*, N. S., *Janthocincla squamata*, *Columba princeps*, *Crax Yarrellii*. The parts will appear at intervals of from six weeks to two months, and will each contain six illustrations, accompanied by descriptions, and occasional wood-cuts representing the characteristic parts of new or little known genera.

TRANSACTIONS AND PERIODICALS—*British.*

Transactions of the Linnæan Society of London, Vol. xvii. Part the Third. 4to. London, 1836.

A continuation of the volume and commencing with—XV. *Descriptions &c. of the insects collected by Captain P. KING, R. N., F. R. S., in the Survey of the Straits of Magellan.* By JOHN CURTIS, Esq., A. H. HALIDAY, Esq., and FRANCIS WALKER, Esq. Mr Curtis remarks, in a short introduction to the paper, "The collection was formed along the coast from St Paul's in Brazil to Valparaiso. The splendid objects of natural history that have been found from time to time in Brazil, and sent to Europe, render it less easy to detect novelties in that country, but those from the opposite coast of Chili are less known, and I have never seen any collection from the extreme south of the New World excepting the present one. It is curious and interesting to trace the similarity that exists in many instances between the corresponding parallels of the southern and northern hemispheres, and in others to observe the analogues which take the place of absent types. Throughout the whole of South America, for example, the genus *Carabus* appears to be unknown, excepting about lat. 50°, where a species of that group, with a narrow thorax, has been found. The genus *Culex* also occurs, and many others might be noticed that not only approach, but are identical with the typical forms of North America and of Europe." The paper is devoted to the Hymenoptera by A. H. Haliday, Esq. and the Diptera by Francis Walker, Esq. Of the former, fifty-five species are described; of the latter, seventy-eight, a great proportion of each being marked as new. The descriptions are entirely Latin, the locality and an occasional remark noted in English, and we have only to regret the scanty proportion of observations which accompanies the specific characters.—XVI. *Description of a new species of the genus Cameleon.* By Mr SAMUEL STUCHBURG, A. L. S. *Cameleon cristatus*.—"Superciliari occipitalique carina elevata et crenulata, caudæ anteriori parte dorsique apophysibus elongatis cristam dorsalem constituentibus; squamis fere rotundis subæqualibus." It is from the river Gaboon in Western Æquinoctial Africa, and is illustrated by an uncoloured lithographic plate.—XVII. *Observations on the genus Hosackia and the American Loti.* By GEORGE BENTHAM, Esq. A new genus is proposed for the Uniflorous Loti, under the title *Microlotus*. Eleven species of *Hosackia* are characterized, and five *Microloti*.—XVIII. *Cha-*

acters of *Embia*, a genus of Insects allied to the White Ants, (*Termites*;) with Descriptions of the Species of which it is composed. By J. O. WESTWOOD, Esq. Three species, under the generic titles of *Embia*, *Oligotoma*, *Olyritha*, are characterized, and illustrated by an uncoloured plate drawn by Westwood. —XIX. *De Marchanteis*. Auctore THOMA TAYLOR. Written entirely in Latin, and giving the characters of the “*Genera et species quas mihi fortuna obtulit.*” Illustrated by four uncoloured plates. —XX. *On a New Arachnide uniting the genera Gonyleptes and Phalangium*. By the Rev. F. W. HOPE. An Arachnide contained in the collection of the late Adrian Hardy Haworth, remarkable for its long hinder legs, proposed as the type of a new genus by Mr Hope, *Dolichoscelis* (*δολιχός* and *σκέλος*) and dedicated to Mr Haworth, *D. Haworthii*. Illustrated by an uncoloured plate. —XXI. *On the Erigoneæ, a tribe of the order polygonaceæ*. By GEORGE BENTHAM, Esq. Illustrated by four plates of *Erigeron*, *Chorizanthe*, *Mucronea*. —XXII. *Observations on the Species of Fœdia*. By JOSEPH WOODS, Esq. This paper chiefly illustrates the subdivisions of Decandolle, taken from the structure of the fruit. —XXIII. *Remarks on some British Ferns*. By DAVID DON, Lib. L. S. *Aspidium Dumetorum* must be erased from Brit. list. (See our *Botanical Intelligence*)—*Nephrodium rigidum* Mr Don considers a good and well-marked species. For some remarks on *Asplenium Filix Fœmina*, see *Botanical Intelligence*. —*Cystea Dentata*, a good species, peculiar to the Scottish Alps, the Welsh plants being considered only varieties of *C. fragilis*.—*Cystea regia* is considered distinct from *C. Alpina*. There is now no British station for this plant, the original one at Low Layton no longer existing, and the Welsh specimens belong to *C. fragilis*. —XXIV. *Descriptions of Five New Species of the Genus Pinus, discovered by Dr Coulter in California*. By DAVID DON, Lib. L. S. Collected by Dr Coulter, who has spent ten years in the investigation of the natural history of Mexico and California. These pines are described from imperfect specimens, which prevent the characters being completed; there is, however, little doubt that they are distinct. They will all prove hardy, and we trust will soon be raised in this country. —XXV. *Some account of the Galls found on a species of Oak from the Shores of the Dead Sea*. By AYLMER BOURKE LAMBERT, Esq. The “*Mala Insana*” of Hasselquist, and proved to be identical with the galls of commerce, and growing on the *Quercus infectoria*. Illustrated by a coloured plate. —XXVI. *On several New or imperfectly understood British and European plants*. By CHARLES C. BABINGTON. Mr Babington is convinced of the distinctness of *ERICA MACKALANA*. Seventeen species are noticed, and annotated on.

The Edinburgh New Philosophical Journal. Conducted by Professor JAMESON. October 1836, January 1837. Edinburgh, A. and C. Black. 8vo. (Continued from p. 402.)

Zoology.

1. R. JAMESON, Esq. *Assistant-Surgeon, 10th Regiment of Foot*.—Notes on the natural history and statistics of the island of Cerigo and its dependencies. 62. Continued from the last Number of the Philosophical Journal, and devoted to the zoology of the island. The departments are treated of separately, a few paragraphs being devoted to each.—*Invertebrate Animals*. Very slight notice is taken of these, and insects are passed over as “requiring more space than can be at present afforded.” A remark is made that molluscous animals

are rare, "on account of their forming a chief article of food during the long fasts prescribed by the Greek church."—*Vertebrate Animals*. "The animals of this great division are few in number." *Fishes*.—In autumn shoals of *Hemiramphus* appear on the coasts, and are caught by lines trailed on the surface-water. The species most commonly met with in the markets are, the genus *Percis*, *Smaris vulgaris*, *Sargus*, *Pagrus vulgaris*, *Crysophrys aurata*, *Serranus scriba* and *cabrilla*, *Trigla lyra*, and *hirundo*, *Mullus surmuletus* and *barbatus*, *Scorpetta*, *Cottus*, *Trachinus*, *Zeus*, *Caranx*, *Cybius*, *Dentex*, *Crenilabrus*, *Labrus*, *Torpedo*, *Ophysurus*, *Pleuronectes*, *Scyllum*, *Trygon*, *Hemiramphus*, *Sygnathus*. A more extensive list than is generally met with in other markets. *Reptiles* are not abundant. Among those mentioned are, *Lacerta agilis*, *Coluber berus*, *Rana esculenta*, and *Bufo vulgaris*. *Birds*. "In Cerigo stationary birds are few in number, but hosts appear, remaining a longer or shorter period in spring, on their passage north to spend the summer in more temperate climes, and in autumn on their return." A list under the different seasons in which their visits are made is given, too long to extract, but containing European species only. Only four or five birds are mentioned as truly indigenous, a remarkable feature in the zoology of the island. Quails are very abundant, and the inhabitants catch them much in the same way that an entomologist secures his prey, by means of an oval net at the end of a long pole; a party of three will sometimes secure twenty or thirty couples during the day. *Quadrupeds* existing now in a wild state are few. *Canis aureus*, *Vespertilio murinus*, *Rhinolophus f. equum*, *Mustela foina*, *Lepus timidus* and *cuniculus*, *Mus rattus* and *musculus* are all that are noted; the *Vespertilionidæ* will, however, be most probably underrated. Of the domestic animals, an average of five years in Cerigo gives annually 3132 horned cattle, 5524 goats, sheep, 16,809. The hog is an inmate of every peasant's cottage.—II. *Memoir on the Chemical composition of Asses milk*. By M. E. Peliget. (Translated from the French.)—III. *Farther preliminary notices regarding Fossil infusoria*. By Prof. C. B. EHRENBURG. (From Poggendorff's Annalen.)—On the Unity of Structure in the Animal Kingdom. By MARTIN BARRY, M. D. A paper strongly advocating the view of the subject which is stated in the title.—Observations upon the Fossil Polypi of the genus *Eschara*, read before the Academy of Sciences, Paris. By MILNE EDWARDS.—Observations regarding Fossil Infusoria. By Professor EHRENBURG.—(From Wiegman's Archiv.)

Botany.

On the relations of colour and smell in the more important families of the vegetable kingdom, translated from Ueber das Licht vor Zugtweiss uber die Chemischen, &c. An interesting paper, illustrated by numerous tables exhibiting the ratio in which smell exists in plants of various colours. The results of the examination of 4200 plants are given.

Loudon's Magazine of Natural History. New Series. January and February 1837. (Continued from p. 490.)

THE new series has begun with a decided improvement, first in the quality of the papers admitted, and 2dly, in the exclusion of some things which tended to lower the character of the Magazine in its primary epoch. We also like the practice now adopted of giving us "Translations" from the foreign journals, al-

though it is to be regretted that in the selection of these papers the Editor must be guided, not by their merit, but by the smallness of the cost at which they can be got up. There are some admirable essays in the *Annales des Sciences*, &c., both botanical and zoological, far superior in the importance of their subjects, in interest, and in novelty to those selected, but the plates required to illustrate them is a veto absolute, and not to be removed in this country for years to come,—until a love of genuine science shall have displaced that fickleish amateurship now so common, and frequently forsooth held up as a proof of the wide spread which natural history has made among us! Oh Yes, “Illustrations” for the drawing-room,—“coloured figures” for wealthy collectors—too lazy or ignorant to determine their species without this aid—and “Popular Histories” for children, sell all well enough, but let us note the spread of natural science by a higher test,—and how few are they who would subscribe to put into an English dress the essays of Morren, Müller, Dujardin, Edwards, Turpin, Rusconi, and a host of others? We can merely indicate the contents of our contemporary, whose success will give us sincere pleasure.

1. Zoology.

BLYTH on the Psychological distinctions between Man and all other Animals; and the consequent diversity of Human Influence over the inferior Ranks of Creation, from any mutual and reciprocal Influence exercised among the latter, p. 1, and p. 77. An essay of very considerable merit.—Description of a new British fish, by Dr ED. MOORE, p. 17. The fish is *Peristedion Malarmat*, *Lacepede*, the *Trigla cataphracta*, *Lin.* and was taken between Plymouth and the Eddystone.—BREE's observations upon *Trochilium crabroniformis*, the Lunar Hornet Sphinx, p. 19. This insect is, we believe, of frequent occurrence in the north of England, and south of Scotland. We have lately seen specimens of the *Salix caprea* cut in Berwickshire, perforated in many places with the grub of it.*—STRICKLAND on the mode of Progression observed in the genus *Lima*, *Brug.* p. 23.—CHARLESWORTH on the Occurrence of *Voluta Lamberti* on the Suffolk coast; with observations upon its claim to rank with existing species, p. 35.—Observations upon *Voluta Lamberti*, with a description of a gigantic species of *Terebratula* from the Coralline Crag, by ED. CHARLESWORTH, p. 90.

2. Botany.

CHRISTY's Notices of Rare Plants collected in Jersey, p. 25.—BOWMAN on the Longevity of the Yew, as ascertained from actual sections of its Trunk; and on the origin of its frequent occurrence in churchyards, p. 28, and p. 85.—BIRD's Remarks on a particular form of irritability observed in the stems of many plants, especially exogens, evinced on dividing them in the direction of their axis, p. 57.—Some observations on the oak, by VON OSDAT, p. 74. We hope to see many papers like the *two* preceding, and no more like this.—Such is a list of the *original* papers in these numbers, for we omit of purpose any notice of the Translations and Reviews.

* In Dumfries-shire it is abundant, inhabiting in the larva state *S. caprea* and the Black Italian poplar. The perfect insect, however, is scarcely ever taken, and specimens are to be procured with certainty only by rearing the caterpillar.—W. J.

Entomological Magazine, No. XVIII. January 1837. (Continued from p. 490.)

Art. 26. Continuation of the " Wanderings and ponderings of an Insect Hunter ;" which has extended through several numbers. It is unnecessary that we should express an opinion regarding the character of this effusion ; but the propriety may surely be questioned of devoting so large a space to a paper which has no relation whatever to the appropriate and professed objects of the magazine. We admit the difficulty of giving a somewhat popular complexion to a work of this nature, but any attempt made with that laudable view should be in close connection with the legitimate purposes for which it was established.

—27. In striking contrast to the preceding article, this forms a continuation of Mr Haliday's elaborate and valuable paper on *Parasitical Hymenoptera*.—

28. *Notes on various Insects*. By J. W. BOND. Combat of ants—economy of *Clytus arcuatus*—nest of the common wasp.—

29. *Notes on Diptera*. By F. WALKER. These notices of the dipterous species occurring in Britain are calculated to be very useful, for we have yet a most incomplete knowledge of this department of entomology. Besides the citation of numerous localities, Mr Walker describes three new species of *Platypalpus*, as well as other new species, two of which he refers to genera named by himself. We are glad to see that his investigations have extended to Scotland ; we have ascertained the existence in that country of several kinds of *Molobrus*, not indicated as having occurred to him there.—

30. *Notes of Captures*. By DELTA. Additional localities mentioned for some of the rarer Lepidoptera. It is stated that the larva of *Leminitis Camilla*, differs from that figured by Curtis on the authority of Hubner, and that it may be found by carefully hunting the leaves of the honeysuckle. We wish it had occurred to Delta, that a description of this caterpillar would have been greatly more desirable than an extract from Oviedo, touching scorpions.—

31. Further observations on the Septenary System. By EDWARD NEWMAN. A recapitulation of the principles of the septenary system, and affording further illustrations of it, with a view to supply some deficiencies in " Sphinx vespiformis." In the last sentence of his paper, the author expresses his belief, that the most important characteristic of the septenary system now appears to be *radiation from a centre*, in other words, that it is eccentric, a statement, we fear, in which its opponents will be too willing to acquiesce.—

32. Notes about *Cillenum laterale* and a sub-marine species of Aleocharidæ. By A. H. HALIDAY, M. A. The small beetle *Cillenum littorale*, is found abundantly on the shore near Dublin. It preys on sand-hoppers (*Talitrus locusta*, Leach.) A great part of its existence is passed under the sea. The same peculiarity is observable in a minute brachelytrous insect described, apparently for the first time, by Mr Haliday under the name of *Diglossa mersa*. It seems to belong to the family *Oxytelidæ*.—

33. Notes on the economy of *Gyrinus villosus*. By Rev. A. W. GRIESBACH.—

34. Discovery of *Elater crocatus* (Zeigler) announced. By THOMAS DESVIGNES.—

35. Description of two Scarabæi (*Propomacrus Arbaces*, Newman, and *Scarabæus Croesus*) in the cabinet of Samuel Hanson, Esq. M. E. S. &c. By EDWARD NEWMAN. With an ill-engraved and uncoloured plate.—

36. Verses.—

37. Notes on Tenthredinidæ. By EDWARD NEWMAN. Contains characters of several species, and a new genus *Euura* allied to *Pristophora* of Stephens proposed.—

38. Some account of the birds of Godalming. By WARING KIDD and others.—

39. Proceedings

of the Entomological Club. The proceedings of this body are probably more interesting to the parties immediately concerned than to the public. The numerous contributions received must soon enable them to form a very extensive collection of insects. In a journey by Messrs Walker and W. Christy to the neighbourhood of North Cape, six different kinds of butterflies were found in that high latitude. Varieties of *Hipparchia ligea* and *blandina* were so intermixed, that it was impossible to separate them, and it is hence inferred that these constitute but a single species. In the present state of our knowledge, it would perhaps be safer to conclude, that when two closely allied species occur in profusion in the same locality, a sexual union sometimes takes place between them, and hybrids are produced partaking of the attributes of both. We know that *Pontia napi* and *P. rapae* have been observed united, and also *H. hyperanthus* to *H. Janira*—species not so intimately related to each other as *H. ligea* and *H. blandina*.—40. Proceedings of the Entomological Society of France.—41. Proceedings of the Entomological Society of London.—42. List of Entomological works.

Companion to the Botanical Magazine. By SIR W. J. HOOKER, Professor of Bot. in the University of Glasgow. Parts xvii. xviii. xix. xx. (Continued from page 404)

These numbers are wholly devoted to a biographical account of Mr Douglas, and agreeably to our promise (No. IV. p. 404), we present to our readers a notice of the interesting Memoir of this lamented Naturalist, and regret that our necessarily circumscribed limits prevent going into more ample details of a zeal, unsurpassed perhaps in the cause of botanical science, and of dangers encountered with the most fearless intrepidity, and which at last proved unhappily fatal.

Mr Douglas was born at Scone, near Perth, in 1799, of humble but respectable parents. At a very early age he was sent to school, but seems to have had less relish for book-learning than for fishing and bird-nesting and collecting flowers,—a taste which soon ripened into a fondness for the pursuits and objects of Natural History, generally, but in particular of botany. This led to his employment in the gardens of the Earl of Mansfield, at that time under the superintendence of Mr Beattie, to whom he was bound as an apprentice for seven years. In this situation he devoted his whole heart and mind to the attainment of a thorough knowledge of his business, and acquired that decided taste for botanical pursuits which he so ardently followed in after life. From the gardens at Scone he was removed to those of Sir Robert Preston, at Valleyfield, near Culross, where his botanical taste was much improved by the rich collection of exotic plants cultivated there, and by the contents of a valuable botanical library to which he was kindly permitted access. After remaining two years at Valleyfield, he succeeded in gaining admission to the Botanical Garden at Glasgow, where he applied to his professional duties with so great a diligence and success as to gain the friendship of all who knew him, and particularly of Dr Hooker. He was in consequence recommended by that gentleman to the London Horticultural Society, as a botanical collector; and in 1823 was dispatched to the United States, where he procured many fine plants, and enriched the Society's collection of fruit-trees. On his return, he was sent in the following year "to explore the botanical riches of the country in North-West America, adjoining the Columbia river, and southward towards California. After a long and tedious voyage of above eight months, during which he omitted no opportunity of gratifying

his taste for objects of natural history both at sea and the various coasts and islands on which he occasionally landed, he reached the Columbia river on the 7th of April 1834, and lost no time in commencing his researches. Fortunately for the interests of botanical science, Mr Douglas, while exploring these remote and hitherto untrodden regions, kept a regular journal of his proceedings, and from this, as given in the Memoir, we shall now present our readers with some interesting extracts.

"I may mention some birds of this country (vicinity of the Columbia) that came under my notice; and first, the *silver-headed eagle*, (*Aquila leucocephala* of Richardson and Swainson?) a grand creature, abundant wherever there are rivers containing fish. These birds perch on dead trees and stumps overhanging the water, and are invariably found near cascades and falls; they are wary and difficult to be killed, although other species of eagle do sometimes overcome them. The voice is a shrill whistle: they build their nests in large trees, not confining themselves to dead trunks, and appear always to select the most conspicuous situations, such as the tops of steep rocks, points and necks of land, where they may be almost certainly looked for. Two, three, and even four young ones are hatched at a time, which keep the nest, and continue on the tree much longer than most birds, seldom quitting the vicinity of the place where they were reared. The colour of the first plumage is a brownish-black, which in the first spring assumes a mottled grey, lighter on the head and tail; the second year, these parts become perfectly white and the body black. I killed one of these birds flying last July; it was a fine large male, and was perched on a stump close to the village of Cockqua, one of the principal chiefs of the Chenook nation. This tribe was at war with the Clatsops, and some other Indians, and many were the feats of strength and dexterity which they performed in order to show their superior powers, among which were hitting a mark with a bow and arrow, and a gun. One individual passed the arrows through a small hoop of grass six inches in diameter, thrown up into the air by another person, and then with his rifle struck a mark one hundred and ten yards distant, exclaiming that none of King George's chiefs could do the like any more than chaunt the death-song and dance war-dances with him. On this bravado, deeming it a good opportunity to show myself a fair marksman, the poor *silver-headed eagle* was made to pay for it. I lifted my gun, which was charged with swan-shot, walked to within forty-five yards of the bird, and throwing a stone to raise him, brought him down when flying. This had the desired effect; many of the natives, who never think of the possibility of shooting an object in motion, laid their hands on their mouths in token of fear, a common gesture with them. The fellow, however, still shewing himself inclined to maintain his superiority, gave me a shot at his hat, which he threw up himself, when my shot carried away all the crown, leaving nothing but the brim. My fame was hereupon sounded through the whole country, and a high value attached to my gun. Ever since, I have found it of the utmost importance to bring down a bird flying when I go near any of their lodges, at the same time taking care to make it appear as a little matter, not done on purpose to be observed. With regard to the hat in question, I may mention that it was woven of the roots of *Helonias tenax*, which the Indians of the Columbia call *Quip-Quip*; and on my observing the tissue with attention, Cockqua promised that his little girl, twelve years of age, should make me three or four after the European shape, giving me at the same time his own

bat, and a large collection of baskets, cups, and pouches of the same material, for which I paid in tobacco, knives, nails, and gun-flints. The roots of *Cyperus* and *Thuja* are also used for the same purpose. When returning last summer from the Grand Rapids, I saw one of these *silver-headed eagles* take a small sturgeon out of the water, and as he was soaring over my head, I lifted my gun and brought him down. The claws of the bird were so firmly clenched through the cartilaginous substance of the fish's back, that he would not let go, till I introduced a needle into the vertebrae of his neck. The sturgeon measured fifteen inches long, and weighed four pounds."—No. cxix. pp. 98, 99.

"On Thursday 23d (March 1826,) we proceeded on our voyage with a strong westerly wind, which enabled us to hoist a sail, and reached the lower part of the great Falls at dusk, where we camped in a small cove under a shelving rock. Fortunately the night was fine, and the moon bright, which was the more agreeable, as the wind would not allow of our tent being pitched. Here we were placed in a dangerous predicament, from the natives who collected in unusually large numbers, and showed every disposition to be troublesome, because they did not receive so ample a supply of tobacco as they had expected. We were obliged to watch the whole night. Having a few of my small wax tapers still remaining, I lighted one, and sat down to write to Mr Murray of Glasgow, and to arrange in paper some mosses that I had collected the preceding evening. Daylight was a most gladsome sight, as may be imagined, after spending the hours of darkness surrounded by at least 450 savages, whose manners announced anything but amicable feelings towards us. As no one in the brigade could converse with them much better than myself, little could be done by persuasion. However, discovering that two of the principal men understood the Chenook language, which I am slightly acquainted with, I found this circumstance of some advantage. After taking a hurried and anxious breakfast on the rocks, we proceeded several miles up the river, and in the afternoon made the portage over the great Falls, where Mr M'Leod was apprized that the Indians were lying in wait with the intention of attacking us and pillaging the boat. This warning proved too correct. No sooner had they received the customary present of tobacco, than they became desirous of compelling us to encamp for the night, that they might the better effect their purpose. The first symptom of hostile intentions which we observed, was their cunning trick of sprinkling water on the gun-barrels of our party, and when the boats were ordered to be put into the water, they would not allow it to be done. As Mr M'L. was laying his hand on the shoulders of one native to push him back, another fellow immediately drew from his quiver a bow and a handful of arrows, and presented it at Mr M'L. My position at the time, at the outside of the crowd, enabling me to perceive this manœuvre, and no time being to be lost, I instantly slipped the cover off my gun, which was fortunately loaded with buck-shot, and presenting it at him, I invited him to discharge his arrow, when I would return it with my own weapon. Just at this moment, a chief of the Kyemuse, and three of his young men, who are the terror of all the other tribes west of the mountains, and the staunch friends of the white people (as they call us) stepped in among the party, and settled the affair without any further trouble." P. 104—105.

"The weather being pleasant, I begun preparing for my great excursion to the mountains, and sent accordingly to the Indian camp to bid my guide be ready by sunrise. During the night I was annoyed by the visit of a herd of rats, which

devoured every particle of seed I had collected, eat clean through a bundle of dried plants, and carried off my soap-brush and razor ! As one was taking away my inkstand, which I had been using shortly before, and which lay close to my pillow, I raised my gun, which, with my faithful dog, always is placed under my blanket by my side, with the muzzle to my feet, and hastily gave him the contents. When I saw how large and strong a creature this rat was, I ceased to wonder at the exploits of the herd in depriving me of my property. The body and tail together measured a foot and a half, the back is brown, the belly white ; while the tail and enormous ears are each three-quarters of an inch long, with whiskers three inches long, and jet black. Unfortunately the specimen was spoiled by the size of the shot, which in my haste to secure the animal and recover my ink-stand, I did not take time to change ; but a female of the same sort venturing to return some hours after, I handed it a smaller shot, which did not destroy the skin. It was in all respects like the other, except being a little smaller."—P. 115.

" About an hour's walk from my camp, (in North California,) I met an Indian, who, on perceiving me, instantly strung his bow, placed on his left arm a sleeve of racoon skin, and stood on the defensive. Being quite satisfied that this conduct was prompted by fear, and not by hostile intentions, the poor fellow having probably never seen such a being as myself before, I laid my gun at my feet on the ground, and waved my hand for him to come to me, which he did slowly and with great caution. I then made him place his bow and quiver of arrows beside my gun, and striking a light, gave him a smoke out of my own pipe, and a present of a few beads. With my pencil I made a rough sketch of the *Cone* and *Pine-tree* which I wanted to obtain, and drew his attention to it, when he instantly pointed to the hills fifteen or twenty miles distant towards the south ; and when I expressed my intention of going thither, cheerfully set about accompanying me. At mid-day I reached my long-wished-for pines, and lost no time in examining them, and endeavouring to collect specimens and seeds. New and strange things seldom fail to make strong impressions, and are therefore frequently over-rated ; so that lest I should never again see my friends in England to inform them verbally of this most beautiful and immensely grand tree, I shall here state the dimensions of the largest I could find among several that had been blown down by the wind. At three feet from the ground its circumference is 57 feet 9 inches ; at one hundred and thirty-four feet, 17 feet 5 inches ; the extreme length 245 feet. The trunks are uncommonly straight, and the bark remarkably smooth for such large timber, of a whitish or light-brown colour, and yielding a great quantity of bright amber gum. The tallest stems are generally unbranched for two-thirds of the height of the tree ; the branches rather pendulous, with cones hanging from their points like sugar-loaves in a grocer's shop. These cones, however, are seen only on the loftiest trees, and the putting myself in possession of three of them, (all I could obtain,) nearly brought my life to a close. As it was impossible either to climb the tree or hew it down, I endeavoured to knock off the cones by firing at them with ball, when the report of my gun brought eight Indians, all of them painted with red earth, armed with bows, arrows, bone-tipped spears, and flint-knives. They appeared any thing but friendly. I endeavoured to explain to them what I wanted, and they seemed satisfied, and sat down to smoke ; but presently I perceived one of them string his bow, and another sharpen his flint-knife with a

pair of wooden pincers, and suspend it on the wrist of the right hand. Farther testimony of their intention was unnecessary. To save myself by flight was impossible, so without hesitation I stepped back about five paces, cocked my gun, drew one of the pistols out of my belt, and holding it in my left hand, and the gun in my right, shewed myself determined to fight for my life. As much as possible I endeavoured to preserve my coolness; and thus we stood looking at one another without making any movement or uttering a word for perhaps ten minutes, when at last one who seemed the leader gave a sign that they wished for some tobacco: this I signified they should have if they fetched me a quantity of cones. They went off immediately in search of them; and no sooner were they all out of sight, than I picked up my three cones and some twigs of the trees, and made the quickest possible retreat, hurrying back to my camp, which I reached before dusk. Of my three cones, one measures $14\frac{1}{2}$ inches, and the two others are respectively half an inch and an inch shorter, all full of fine seed."—No. cxx. p. 130.

On the 20th of March 1827, Mr Douglas started from the Columbia for England, by way of Hudson's Bay, traversing in his route the Rocky Mountains, the "Grand Dividing Ridge" of the mighty Continent of North America, at the height of 16,000 or 17,000 feet above the level of the sea. At the Company's settlements he had the happiness to meet Sir J. Franklin, Dr Richardson, and Mr Drummond, and arrived in England on the 11th of September. About the beginning of October 1829, he again set out, under the patronage, partly of the Horticultural Society, and partly of the Government, for North America, and arrived at the Columbia on the 3d of June 1830. Our limits will not permit us to follow him in his important botanical researches, and in perilous incidents which would have shaken the courage of the most stout-hearted. Suffice it to say, that after having again visited North California, he made an excursion to the Sandwich Islands. One or two short extracts must close this notice. While in California he says,—

"Early as was my arrival on this coast (Dec. 22,) spring had already commenced. The first plant I took in my hand was *Ribes speciosum*, Pursh (Bot. Mag. t. 3530; Bot. Reg. t. 1557,) remarkable for the length and crimson splendour of its stamens; a flower not surpassed in beauty by the finest *Fuchsia*; and for the original discovery of which we are indebted to the good Mr Arch. Menzies in 1779. The same day I added to my list *Nemophile insignis* (Bot. Reg. t. 1713; Bot. Mag. t. 3485,) a humble but lovely plant, the harbinger of Californian spring, which forms, as it were, a carpet of the tenderest azure hue. What a relief does this charming flower afford to the eye from the effect of the sun's reflection on the micaceous sand where it grows."—P. 149.

In the island of Hawaii, one of the Sandwich group, he "visited the summit of *Mouna Roa*, the *Big* or *Long Mountain*, which afforded me inexpressible delight. This mountain, with an elevation of 13,517 feet, is one of the most interesting in the world. The journey (to the top) took me seventeen days. On the summit is a volcano, nearly 24 miles in circumference, and at present in terrific activity. You must not confound this with the one situated on the flanks of *Mouna Roa*, and spoken of by the missionaries and Lord Byron, and which I visited also. It is difficult to attempt describing such an immense place. The spectator is lost in terror and admiration at beholding an enormous sunken pit, (for it differs from all our notions of volcanoes, as possessing cone-

shaped summits with terminal openings,) five miles square of which is a lake of liquid fire, in a state of ebullition, sometimes tranquil, at other times rolling its blazing waves with furious agitation, and casting them upwards in columns from 30 to 170 feet. In some places, the hardened lava assumes the form of Gothic arches in a colossal building, piled one above another in terrific magnificence, through and among which the fiery fluid forces its way in a current that proceeds three miles and a quarter per hour, or loses itself in fathomless chasms at the bottom of the cauldron. This volcano is 1272 feet deep; I mean down to the surface of the fire; its chasms and caverns can never be measured. I visited also the volcano of Thiranea, the lateral volcano of Mouna Roa; it is nearly 9 miles round, 1157 feet deep, and is likewise in a state of terrific activity. I go immediately to Hawaii to work in these mountains. May God grant me a safe return to England." P. 161.

Alas! to England he was destined never to return. After surmounting innumerable dangers with almost unexampled courage and success, he fell a victim at last to one of those accidents, improperly so called, which a mysterious Providence for wise purposes sometimes permits to befall its creatures. His death took place in the Island of Hawaii, on the road to Hido, the residence of the missionaries; and the particulars of the sad event are given in a letter from these gentlemen. It would appear that he lost his way; and his body was found in a pit excavated for the purpose of entrapping wild cattle, and into which a bullock had previously fallen. The face was covered with dirt; the hair filled with blood and dust, the head dreadfully cut, and the limbs mangled and bruised. It was naturally concluded, and the conclusion was confirmed by medical gentlemen who inspected the body, that his death was caused by wounds inflicted on him by the captured bullock.

TRANSACTIONS AND PERIODICALS.—*Foreign.*

Nouveaux Memoires de la Société Imperiale des Naturalistes de Moscow, Tom. iv. (with 13 plates, and forming the 10th vol. of the Collection.) Moscow, 1835. 4to.

In noticing for the first time the Memoirs of a Society which is likely to be little known to many of our readers, we may mention that the Imperial Society of Naturalists at Moscow has existed for many years, and has published numerous volumes of valuable transactions. Its primary object is to investigate the natural history of Russia, and for this purpose a museum is formed, and almost every year individuals are sent, at the expense of the Society, to examine the most remote and least known portions of the empire. The whole expenses of the Society are defrayed by the Emperor, who presents it with an annual donation of 10,000 R. ass. In addition to this each member contributes yearly 30 R. which forms a sum in reserve. Each member on admission must present to the Society a memoir, or a work known to scientific men. The meetings are held monthly. The memoirs are allowed to be written in Latin, German, French, English, Italian, or Russian.

The volume of Transactions referred to above is almost exclusively devoted to Entomology. The first paper, which occupies 113 pages of the volume, is entitled, "Additamenta Entomologica ad Faunam Russicam," and contains the descriptions of no fewer than 233 new species of Coleoptera. These were collected in remote provinces of the empire by Szovitz, an individual employed principally

to examine the botany; but who devoted his leisure hours to what has been called its sister science. This person having been carried off by fever while prosecuting his researches, M. Faldermann was employed to render his entomological discoveries available to the public. While engaged in this undertaking, another collector, named Ménétrés, returned from the Asiatic provinces with numerous acquisitions, and it was deemed advisable that the discoveries of both should appear together. The result is the highly important addition to the number of known species mentioned above. Most of them have been referred to already existing genera, but in four instances, M. Faldermann found it necessary to establish new genera. These he has named *Platynomerus*, *Microderes*, *Tanyproctus*, and *Pachymerus*. The former of these is nearly allied to *Pristonychus*, the second to *Platymetopidis* of De Jean; the third contains two lamellicorn insects, and its station is indicated between *Melolontha* and *Scarabaeus*; the fourth likewise belongs to the lamellicorn section, and has considerable affinity to *Amphicoma*. Several of the species are of considerable size and brilliant colours. Such especially is the *Carabus Humboldtii*, which is equal in size to any of our native species, and has the elytra finely glossed with coppery-red. Thirteen new *Cetonia*s are described and figured, and many of them partake of the lustre and rich colouring which distinguish that beautiful tribe. The brachelytrous species amount to 16. Among the malacodermata, a new species of *Lampyrus* (*L. orientalis* pl. 6, fig. 6, 7), is introduced, so closely resembling our native glow-worm that it might readily be taken for a variety. The eastern insect, however, is distinguishable by being broader, by having the elytra darker and more dilated behind, while there are three distinct ridges along the surface of each. *Cicindela* has received an accession of five species; *Cychrus* 1, *Carabus* 12, *Harpalus* 11, *Cantharis* 11, *Silpha* 6, *Onthophagus* 12. This paper does not advance beyond the section *Heteromera*, but the remaining tribes have to appear in a subsequent fasciculus. The plates, it may be added, are in general well executed, but in no instance are dissections given. Magnified representations of the oral organs when new genera are proposed, as in this case, should be regarded as quite indispensable.—II.—*Description de quelques Coleopteres recueillis dans un voyage au Caucase et dans les provinces transcaucasiennes Russes, en 1834 et 1835.* Par T. VICTOR. This paper is chiefly occupied with descriptions of those minute and singularly formed insects composing the family *Pselaphidae*. Many new localities are cited for species previously known, and a considerable number described and figured, which are considered new. We are likewise made acquainted with a few minute coleoptera belonging to other families, which do not appear to have been previously noticed by entomologists.—III.—*Lettre sur le genre Xeranthemum.* Par F. E. L. FISCHER, et C. A. MEYER. The object of this paper is to elucidate the structure and history of various species of this interesting tribe of plants. Some new kinds are noticed, and useful observations advanced on the synonymy of those formerly described. It is accompanied with two lithographic plates, illustrating the structure of the flowers and pappus.

Bulletin de la Société Impériale des Naturalistes de Moscou. Tom ix. Accompagné de ix. Planches. Moscow, 1836. 8vo.

ART. 1. THE first 115 pages of this volume, of which we need mention only the principal articles, are occupied with a paper by Dr BESSER, entitled "Sup-

plementum ad Synopsis Absynthiorum, tentamen de Abrotanis, dissertationem de Seriphidiis atque de Dranunculis," designed to convey additional information on these subjects, which had previously been treated more at length by the same author.—2. Ueber die erste ursache der unebenheit der festen erdoberfläche.—3. Helices proprie dictæ hucusque in limitibus Imperii Russici observatæ, a JOANNE KRYNICKI. This individual appears to have examined the terrestrial mollusca of Russia with great care, and this communication forms a sequel to others already published by him on the same subject. No fewer than forty-one species are described in this paper very minutely, with their synonyms given at length, and several new species are introduced. In the genus *Helicogena* (Fer.) it is interesting to remark the occurrence of a species well known in more southern regions, viz. *H. pomatia*, which has been found in the wooded and shady districts of Volhynia and Poltava, but it must be accounted very rare. Similar observations apply to *H. nemoralis*, which is likewise classed among the rarer kinds. *H. hortensis* and *H. arbustorum*, well known species in this country, have special localities assigned to them, a proof that they are by no means generally distributed; the former has been found in Volhynia, the latter in Podolia.—4. Ueber Irit und Osmir, zuei neue mineralien; von R. HERMANN. Discovery of two new minerals, named Iridium and Osmium, among the sandy residuum left after the extraction of platina.—5. Libellulularum species novæ, quas inter Wolgam fluvium et montes Uralenses observavit, Dr EDWARD EVERSMAAN. This notice comprises descriptions of four new species of Libellulæ, two of *Æshna* and two of *Agrion*.—6. Lettre de M. le Conseiller d'Etat et chevalier de Gebler, contenant un rapport d'un voyage dans les hautes montagnes Caucasiennes jusqu'à la frontière de la Chine, et description des trois nouvelles espèces de coleopteres. The insects described (and figured) are *Heliophilus hypolithus*, *Clytus Altiacus* and *Chrysomela Kowalewskii*, the latter an elegant species of a rich golden green, with blue ridges on the elytra.—7. Orthoptera duo e montibus catunicis, descripta et iconè illustrata, auctore G. FISCHER DE WALDEIM. These insects, which do not seem very dissimilar to other species of *Grillidæ* already described, are named *Ædipa Gebleri* and *Æ. rhodoptera*.—8. Bereicherung zur kafer-kunde des Russischen reiches, Von F. FALDERMANN. A paper containing descriptions (illustrated by figures) of a considerable number of new coleopterous insects.—9. Quelques mots sur le Caucase par JEAN KALENICZENKOW. The writer was induced to visit the district of the Caucasus by observing that every naturalist who had visited it from the time of Pallas, had succeeded in discovering new objects of interest. He set out in 1832, and the above paper gives a slight sketch of his proceedings, it being his intention to give a more ample account at some future time. He refers chiefly to the plants observed in his route. In the district of Isium he describes the mountains as calcareous, containing fossil shells and belemnites, and they produce many plants entirely foreign to the flora of Kharkov. Beyond them appear the plants belonging to the Steppes properly so called, viz. *Dictamnus Frazinella*, *Statice Gmelini*, *Glycyrrhiza glandulifera* (Kit.) *Artemisia procera*, &c. At Moskovskaia, in the government of the Caucasus, he observed on the sides of hills inclining to the south, and even on their summits, *Xeranthemum Annettae*, *Polygala major*, *Pimpinella Tragium*, *Rosa pimpinellifolia*, *Vitis vinifera*, &c. Near Jessuntouk, the ridges of the limestone mountains are covered with *Rhus cotinus*, *Aconitum Anthera*, &c. The banks of the impetuous river Podkounok are fringed with *Hippothoe rhamnoides*, *Tamarix gallica* and *Palisii*,

Salices, &c. In a valley surrounded on all sides by mountains, from which the Narzanza takes its rise, and where there are thermal baths resorted to by invalids, the most conspicuous and interesting plants are the following: *Betonica grandiflora*, *Polygala Sibirica* (Linn.), *Rhinanthus orientalis*, (Linn.), *Primula amoena*, *Dianthus fragrans*, *Azalia pontica*, (Linn.), *Trollius Caucasicus*, &c.—Beschreibung einiger neuen in Liefland aufgefunden insecten, Von B. A. GIMMERTHAL. Contains descriptions of several new dipterous and neuropterous insects.

Muller's Archiv für Anatomie, Physiologie, &c. Parts iii. and iv.
1836. (Continued from p. 292.)

Ueber de Metamorphosen des Eies der Fische u. s. w. Von M. RUSCONI. *On the changes which the Ova of Fishes undergo previous to the exclusion of the Embryo.*—In order to continue his observations on this subject, the author repaired to the lake of Como early in July, being assured by the fishermen that both Tench and Bleak deposit their spawn at that period. On the 10th of that month he procured some eggs from a female tench (*Cyprinus tinca*, Lin.), and placed them in a glazed earthenware vessel filled with water from the lake. They immediately sunk to the bottom, and two or three drops of milt were expressed from a male fish upon them. The eggs were perfectly transparent, and of a greenish yellow colour, like that of olive oil. The milt was of the colour of milk, but much less fluid. In four hours after the fecundation, some of the eggs seemed to have lost their transparency on one side, and others by degrees assumed the same appearance, so that in twenty-four hours they had all become opaque, and their vitality was considered to be extinct. This the author supposed to have arisen from too large a quantity having been laid one upon another in the vessel, and he accordingly took a flat shallow dish, the bottom of which was covered with paper, and filled it with lake water. Some more fecundated ova were then placed in it, so that they did not come in contact with one another. In five hours he again remarked that some had become opaque on one side, and in twenty-four hours the same thing had occurred to nearly all. Some few, however, remained transparent, and these he raised gently from the dish, by means of the paper that was under them, and transferred them to glasses of water for farther observation, placing eight or ten in each; in six or seven hours after this operation, he saw by means of a microscope that the embryo had begun to move, and in twenty-four hours (fifty from the moment of fecundation) the young fishes burst through their envelope. The experiment was again repeated in order to ascertain whether the ova of fishes undergo similar changes to those of the Batrachians (vide Analysis of Müller's Archiv at p. 292,) and half an hour after the eggs had been placed in the dish, he lifted out those which remained transparent, and transferred them to glasses as before. It was now his object to destroy the vitality of some of them at each stage of their development, in order to examine the progress that had been made, at leisure, and for this purpose he dropped into the water four or five drops of a mixture of one part of nitric acid and eight parts of water, which had the desired effect. This was applied at intervals of fifteen minutes during ten hours, and the following are the results obtained: Soon after the application of the milt, the ovum of the tench loses its spherical form, and swells out into the form of a pear. At the

point where this swelling begins it is surrounded with a cluster of microscopic globules, which before were spread all over its surface. In half an hour the pear-shaped excrescence is divided into four globules; these in a quarter of an hour more are subdivided into eight, and in a similar period into thirty-two, still remaining clustered together on the top of the egg. In another half hour more globules appear, decreasing in size as they increase in numbers, till at length, from their minuteness, the part of the egg to which they are attached becomes almost as smooth as when they were undeveloped. The embryo fish now becomes discernible in the form of a whitish semitransparent speck, which is the rudiment of the vertebral column. The organization of the skin then gradually proceeds, and the embryo increases in length, coiled round the yolk, till the head becomes perceptible. In forty hours from the fecundation, the embryo tench first gave signs of motion, and at most, twelve hours later, it had freed itself from the skin of the egg. The fish is then two lines in length, and the blood has already acquired its natural colour. For some hours after leaving the egg, the young fry appear stupified; they lie on their sides and are unable to swim, until the swimming bladder is developed, when they immediately assume their proper position and their natural activity. The intestines are not fully developed until seven days after leaving the egg, when they begin to feed voraciously, and exclusively upon animal substances. The fry of the bleak, on the contrary, will only eat vegetable matter, at least during this early period of their existence. The temperature of the room in which these experiments were carried on, ranged from 72° to 77° Fahrenheit. The ova of the bleak are larger than those of the tench, and are for that reason preferable for the purposes of observation, besides being more easily procured. When they had reached the point at which the globules disappear, their vitality was no longer destroyed by the acid before-mentioned; but they were then placed upon a piece of black cloth, or more frequently on a plate of polished silver in a glass of water, and the changes they underwent examined by means of a single lens. The author afterwards had an opportunity of watching a large shoal of *Cyprinus Gobio* in the act of spawning; he took up three or four pebbles upon which about a dozen eggs were deposited, and placed them in an earthenware vessel in his room, and paid no farther attention to them. About eight or ten days after, he observed four young fish swimming about with vigour, which were so transparent as not to be easily seen except in a dark-coloured vessel, and he appears to have met with none of the difficulties in rearing fish from the ova, which Herr von Bæer states to have so much impeded his observation.

These numbers also contain a paper on the Spermatic Entozoa of vertebrate animals by Professor Wagner, and one on those of the invertebrata, by Dr Siebold of Danzig. The latter author also has one on the anatomy of the *Asterias*; and there is likewise the first part of a paper on the effects produced by acetate of lead on the organism of animals (dogs and rabbits), by Dr C. G. Mitscherlich.

Linnea—Ein Journal für die Botanik, u. s. v. Halle, 1835–6.

THE most interesting papers in the latter numbers of this periodical are as follow:—Continuation of the catalogue of Mexican plants.—List of South Ame-

rican grasses by E. Poeppig.—Monograph of the genus *Paulia*.—Catalogue of the Acotyledonous plants of Southern Africa, intended to include all that have been discovered since the publication of Ehrenberg's Flora of that country, part 1st, Filices.—Continuation of the list of plants discovered in the expedition of Romanzoff, with the addition of those collected by Ehrenberg in Hispaniola.—Contributions towards the history of Botany in the 13th century.—Upon the willows in the Hortus Hostianus, and the Dendrothea Bohemica.

Annales des Sciences Naturelles. Zoologie, MM. AUDOUIN et MILNE-EDWARDS. *Botanique*, MM. AD. BRONGNIART et GUILLEMIN. Crochard and Co. Paris, Juillet, Aout, 1836. (Continued from page 489.)

1. Zoology.

THE July Number is occupied with MILNE-EDWARDS' "*Recherches anatomiques, physiologiques et zoologiques sur les Eschares*," a paper which embraces a review of every thing which has been written on the family, a detail of the author's original inquiries, which are very interesting and complete, and a description, illustrated with excellent figures, of all the species known to this date. We shall have occasion to make ample use of this essay in the "*History of British Zoophytes*" publishing in this Magazine; but we desire to mention at present, that Milne-Edwards disputes the accuracy of the view adopted by us, of the inorganic nature of the polype-cells and of the polypidom, contending that these are formed much as bone is in the superior animals, and continue to be in connection with, and under the control of, the living parts. The cell, he says, in which the polype retreats as into a shell, is an integral part of the animal, in which it conceals itself just as the hedgehog withdraws after a manner into the spinous skin of its back. The cell is not a calcareous crust which is moulded on the surface of the body of the polype, but a portion of its general tegumentary membrane or skin, which by a molecular deposition of earthy matter in the meshes of its tissue, hardens as the cartilages of the superior animals harden themselves, without ceasing to be the seat of a nutritive movement. The facts on which Milne-Edwards grounds this conclusion, we are willing to admit appear conclusive; and we have only to guard against its general applicability, for the explanation refers only to the polypidoms of which we have designated "*ascidian polypes*."

The analysis of the proceedings of the "*Academie des Sciences*" embraces a continuation of the interminable notices of the Orang-Outang, and its verisimilitudes to man, with which GEOFFROY SAINT-HILAIRE, from sitting to sitting, entertains the academy; LEON DUFOUR's account of the parasite of the *Andrana aterrima* already mentioned by us, p. 295; a letter from ALEX. BRONGNIART on Ehrenberg's discovery of fossil Entomostraca and other infusory animalcules; a notice of a shower of Frogs which fell in August 1804, near Toulouse; DOUVE on the action of pus upon blood newly drawn from the veins; and a long and curious note upon the Guacharo (*Steatornis Caripensis*, Humb.) of the Cavern of Caripe.

The contents of the number for August are, "*Memoire sur l'émigration du Puceron du Pêcher (Aphis persicæ), et sur les caractères et l'anatomie de cette*

espèce, par CH. MORREN,—which is extremely interesting and well illustrated “*Note sur une nouvelle espèce d’Actinie, par M. DUGES.*” The species is closely allied to, if it be not identical with, the *Actinia maculata*, described by Dr Coldstream in the Edinburgh New Philosophical Journal, ix. p. 236 : *Extrait d’un mémoire sur la place que doit occuper dans le système ornithologique le genre Chionis, par M. DE BLAINVILLE.* The memoir concludes thus—We believe it then to be demonstrated, that with the Gallinacæ (even embracing in that family the pigeons, though erroneously as we think,) this genus has the least relationship, although the alary system is very nearly the same in both, for in every other respect there is a complete dissimilarity, as well in the organization as in the manners and habits. Between the Waders and the Palmipedes the choice is more difficult, because these two orders glide into one another at almost every point. However, it is with the Cursores among the Waders, that we find the greatest resemblance to Chionis, and among them this is nearest affined to the oyster-catcher or *Hæmatopus*, whose organization and economy is very similar. In these two genera, 1st, the number of vertebræ is the same, 15—6—14—8 ; 2d, the number and shape of the ribs are the same ; 3d, the sternum, of the same general figure, has two sub-equal emarginations, the superior a little larger than the inferior ; 4th, the intestinal canal of both has three cæca, of which the two terminal are moderately sized, and the median very small ; 5th, the stomach is in both formed of a very small gizzard without a crop ; 6th, the tail is short, and composed of six pairs of equal feathers ; 7th, the wings, formed of ten quills “à la main,” are acute ; 8th, the legs are little raised, and naked only towards the talons ; 9th, the tarsi, not compressed, are equally reticulated before and behind ; 10th, the sole of the toes is flattened in a manner that they appear margined ; 11th, both birds are walkers and runners ; 12th, they both dwell on the sea shores, where, 13th, they seek their food, consisting of shell-fish and perhaps of dead animals. It is then near *Hæmatopus* that Chionis ought to stand, although the figure of the beak is very different, but now where is the zoologist who is ignorant that the consideration of that part is of little importance in deciding the natural affinities of birds ?—*Extrait des Recherches sur la marche de l’ossification dans le sternum des oiseaux, pour faire suite aux travaux de MM. Cuvier et Geoffroy St Hilaire, par M. F. LHERMINIER.*

In the “Analysis” of the month there is an abstract of the following papers read before the Academy : *Lettre de M. ROULIN sur l’existence du Guacharo dans la province de Bagota.*—*Education des vers à soie.*—*Reflections sur l’Heteradelphine, par GEOFFROY ST HILAIRE.*—*Gras observations relatives à l’Acarus scabiei.*—*Lettre de M. KAUF sur la tête fossile du Dinotherium giganteum.*—*Revision de la famille des Anolis, par M. COCTEAU.* M. C. D’ORBIGNY sur des ossemens fossiles des environs de Paris.

2. Botany.

July. *Observations sur les Biforines, organes nouveaux situés entre les vésicules du tissu cellulaire des feuilles dans un certain nombre d’espèces végétales appartenant à la famille des Aroïdées, par M. TURPIN.* A most important and beautiful essay.—C. MONTAGNE sur les Plantes cryptogames récemment découvertes en France. These notices are very similar to those with which Mr Berkeley favours British botanists through the medium of this Magazine.—*Labiatae orientales herbarii Montbretiani, seu Labiatarum species novæ vel minus cogni-*

tæ quas in Syriâ et Asiâ minore collegerunt Gustavus Coquebert de Montbret et Aucher-Eloy. Ex. speciminibus herbarii Montbretiani descripsit G. BENTHAM.—Plantarum Mongholico Chinensium Decas prima; auctore AL. BUNGE.

August. *Remarques sur les affinités du genre Heliwingia et établissement de la famille des Helwingiacées*, par M. J. DECAISNE.—Flora Japonica, auct. F. de SIEBOLD et ZUCCARINI. A review of the two first fasciculi.—*Observations sur le genre Galium et quelques genres voisins*, par J. E. TAUSCH. The author divides Galium into two sections, thus: * *Eugaliun*. Flores anthesi coætanei seu superiores primores. ** *Rubeola*. Flores anthesi succedanei, ab imo versus apicem progredientes. The division is an interesting one, and possesses the advantage over those in common use of indicating an important difference in the habits of the species. We should like to see some of our young and rising botanists engaged in a Monograph of our British Galia.—*Recherches sur les caractères des Gagea et sur la place que ce genre doit occuper dans les familles naturelles*, par M. BERNHARDI.—Flora Germanica exsiccata, curante L. REICHEMBACH. A review.—Annotationes botanicæ ex indice seminum horti academici Gottingensis, auct. Schrader, excerptæ: ex indice seminum horti bot. Vratislaviensis, auct. NEES AB ESENBECK et SCHAUER, excerptæ: e deductu seminum horti botanici Hamburgensis, auct. LEHMAN, excerptæ.—*Note sur les Euphorbia platyphyllos, micrantha et stricta*, par M. HOCHSTETTER.—*Champignons d'Italie, principalement les espèces comestibles, veneneuses, ou suspectes, décrites et accompagnées de planches*, par le professeur D. Viviani. A review.—Durîæ iter Asturicum botanicum, anno 1835 susceptum, auctore J. GAY.

INTELLIGENCE.

BOTANICAL.

Aspidium dumetorum.—A species first proposed by our late President in the 4th volume of the English Flora. This is made up of two plants, the one from Cromford Moor, being a dwarf state of *A. dilatatum*, and the other from Ravelston Wood, near Edinburgh, having the segments of the frond abruptly truncate, and the habit, at first sight, altogether peculiar; but an inspection of the original specimens in the Smithian herbarium proves it to be nothing more than an accidental variety of the same species, namely, *Aspidium dilatatum*, arising from disease, which is shown by the sudden termination of the costal, and by the partial decay of the other segments. Specimens of the more ordinary state of *A. dilatatum*, gathered at the same time and from the same locality, are similarly affected, but in a less degree. The distinctions derived from the fructification in the English Flora are altogether fallacious, and are partly dependent on the age of the frond, and partly on that of the individual plant. It is clear, therefore, that the *Aspidium dumetorum* must be erased from the list of species.—Don. Trans. Linn. Soc. Vol. xvii. Part iii.

Asplenium Filix Fœmina.—There are two very marked varieties of this plant; the one with broader segments of a dark-green, and with the stipes and rachis of a pale-purple hue; the other, and that the commonest, with the segments of a more delicate texture, and the whole frond of a pale-green. The latter variety varies much in size, according to soil and situation; in damp shady places it becomes the *Filix fœmina* of English botany, and in more open exposed situations the *irriguum*; but neither of these states is entitled to be regarded as a distinct form.—Don. Trans. Linn. Soc. Vol. xvii. Part iii.

Pilularia.—In the last Number of the Magazine of Zoology and Botany, there are some observations regarding *Pilularia globulifera*; the author of them states the absence of spiral vessels, and does not mention the occurrence of vessels of any kind in the fibrous root of the plant. By careful and repeated examination of the roots, slender creeping stem and leaves of *Pilularia*, I have detected in each one of these parts a central fasciculus of ducts mixed with *spiral vessels*, and after many attempts, I have succeeded in unrolling the spiral fibre of the latter. This was effected by tearing the parts asunder by means of fine needle points. It is necessary to do this in a drop of water and under a high power of the microscope. Moreover, the parts must be previously macerated in water during a considerable length of time.

The presence of spiral vessels will thus strongly support Dr Lloyd's opinion, viz. that *Pilularia* deserves to hold a higher rank in the vegetable creation than has been supposed hitherto. With regard to Dr L.'s concluding remarks on the circulation in *Pilularia*, they are not strictly in accordance with the opinions of

modern physiologists regarding the functions of spiral vessels (and ducts), and for this, Lindley's Introduction to Botany, pp. 249, 250, may be consulted.—GEORGE DICKIE.

Chara.—The globules of *Chara* contain filaments which with a low power of the microscope appear transversely undulated. With a plano-convex lens of very high power, I have observed that the filaments consists of transparent tubes, containing in their interior numerous oval, and in some cases irregularly-shaped bodies, the greatest diameter of which corresponds to the short diameter of the containing tube. The bodies generally present the appearance of rings, having no apparent connection with the walls of the case which contains them. In many instances they are crowded together, and irregular in shape ; in others they are oval, and placed at equal distances. The fecula which I have seen in the globules seems to have no connection whatever with the bodies now mentioned.—GEORGE DICKIE.

Fig. 1 represents portions of different filaments very highly magnified.



Jungermannia.—In the axillæ of the leaves of *Jungermannia pusilla*, numerous small bodies frequently occur (anthers of some writers.) They are of a white colour, and consist of a reticulated membrane ; each is supported on a short footstalk. On rupturing these bodies, numerous transparent particles issue forth ; the resemblance of these latter to fecula is very apparent, and on the application of iodine they become blue. It occurred to me that the bodies now mentioned might be perhaps one way, by which *Jung. pusilla* is propagated. I therefore placed some of them in circumstances which appeared to me to be favourable to germination, but after a lapse of several weeks, they had undergone no alteration. Their true nature, therefore, still remains uncertain.—GEORGE DICKIE.

Fig. 2 represents one of the bodies highly magnified.



MISCELLANEOUS.

BOTANICAL SOCIETY OF LONDON.—November 17, J. E. Gray, Esq. F. R. S. in the Chair.—A meeting of this Society took place at their new rooms, 11, John Street, Adelphi. Many donations of books and plants were announced, and thanks ordered to be returned. The laws as again revised,

were submitted previous to their being printed, and distributed to the members, and it was understood they were to be confirmed at the anniversary meeting on the 29th November next, when also the other officers will be appointed. A memoir was then read by A. Irvine, Esq. of Croydon, Surrey, on the importance of local botany. He stated that Mexico and the regions of the Andes are known to contain 6000 species, of which not 12 in number are found in Europe. He stated that 1500 species of flowering plants are to be found wild in Britain, of which about two-thirds are to be found within a circle of twenty-five miles round London, as mentioned in *Cooper's Flora Metropolitana*. Mr Irvine has himself discovered 670 species within two miles of Hampstead, Middlesex. Within an equal distance of Croydon he has found no less than 900 different species, and he has reason to suppose many more grow within the same limits. The species of vascular plants found in Great Britain comprise nearly all those growing in Lapland and Sweden, three-fourths of those growing in Germany, of which that country is estimated to contain about 2000 different species. The British plants comprise about three-fifths of those found in France, which amount to about 4000; the southern provinces bordering on the Mediterranean making a great addition to the number of the species. The Flora of the presidency of Madras, as hitherto published, contains 2800 species, but the whole of Hindostan is known to contain 8000.

Mr Irvine made some observations on the state of chemical botany, and stated that results of the utmost importance to the welfare of mankind, may be expected from further research into the dietetic and medicinal properties of plants. The meeting adjourned till 29th.

Nov. 29. J. E. Gray, Esq. F. R. S., in the Chair.—The first general meeting of this society took place on the 29th November 1836, the anniversary of the birth day of the illustrious English botanist, "*John Ray*," when the laws were confirmed and ordered to be distributed, and the officers elected. The officers for the year 1837 are as follows:—

John Edward Gray, Esq. F. R. S., *President*.

Dr Macreight, F. L. S.; Charles Johnston, Esq. *Vice-Presidents*.

John Reynolds, Esq. *Treasurer*.

Daniel Cooper, Esq. *Curator*.

W. M. Chatterly, Esq. *Secretary*.

Other Members of the Council.

Edward Charlesworth, Esq. F. G. S.

George E. Dennes, Esq.

Dr James Mitchell, F. G. S.

Joseph Freeman, Esq.

Dr Bell Salter.

Dr M'Intyre, F. L. S.

C. E. Sowerby, Esq. A. L. S.

H. A. Meeson, Esq.

W. H. White, Esq. M. M. S.

The president then addressed the meeting, congratulating them upon the flourishing condition of the society, and also of botanical science, especially in this country, and enumerated the advantages likely to proceed from the establishment of this society and *Botanic Garden* in the metropolis. Dr Macreight suggested the propriety of printing the address, which contained so much that was new, important, and interesting; the matter was referred to the Council. A vote of thanks was proposed, and carried unanimously, to the President for his able and kind address. The meeting then adjourned until December 1st.

Dec. 1st.—J. E. Gray, Esq. F. R. S., President, in the Chair.—The names

of the visitors having been read, several donations to the Library, Herbarium, and Museum were announced, and thanks ordered to be returned. A paper was then read by H. A. Meeson, Esq. on the formation of wood, in which he advocated the theory of Du Petit Thouars. Some discussion having taken place, the President dissolved the meeting.

Dec. 15th.—J. E. Gray, Esq. F. R. S., President, in the Chair.—The minutes of the last meeting having been read and confirmed, and the names of the visitors introduced announced, the secretary read the list of donations to the Library, Herbarium, &c.

A paper was read by the Secretary from Dr Macintyre, F. L. S. on the Flora of Warley in Essex, the summary of which was, 10 genera, and 23 species of ferns were found in that vicinity: that the monocotyledonous plants amounted to 65 genera and 136 species: dicotyledonous to 265 genera and 542 species, exclusive of the *Salices*. Some localities of the rarer plants about Dover, Kent, as stated in Watson's New Botanist's Guide, were confirmed by Mr G. E. Dennes. After some discussion had taken place, the president announced the next meeting of this Society would take place on 5th January 1837, when a paper would be read by the curator, Daniel Cooper, Esq. on the distribution of the localities of plants in *Battersea Fields*, giving a map or plan indicative of their particular localities.

Jan. 5.—J. E. Gray, Esq. President in the Chair. After the visitors' names and the minutes of last meeting had been read and confirmed, and the donations announced, a Memoir was read by the Curator, Daniel Cooper, Esq. on the distribution of plants in a well known and rich locality in the neighbourhood of London, "*Battersea Fields*," accompanied with a map or plan exhibiting (on the scale of 2 feet to a mile) the particular localities of the rarer species. To this gentleman practical botanists are indebted for this novel idea, which will prove of essential service to the Field Botanist. Mr Cooper stated at the conclusion of his paper, that when the various railroads now in contemplation have been executed, the localities in the neighbourhood of London will in a great measure be overturned and obliterated; and it was his opinion that the Members of the Society should work together in order to arrive at the greatest accuracy, and produce plans similar to that before them, so that at a future period, when railroads and such like public undertakings have demolished our richest localities in the neighbourhood of this extensive metropolis, we shall possess at least a plan to show our descendants that such plants did exist at a stone's throw from London. He also stated that he hoped that the rough sketch now before them, as an example, would be followed up by the Members, so that, in the course of a few seasons, we may possess plans exhibiting the distribution of plants throughout England, Wales, and Scotland, or in whatsoever direction the working members may be called. On the result of the number of species found in this locality, Mr Cooper made the following remarks. Of the 104 natural orders of British Flowering Plants mentioned in the 1st ed. of Lindley's Synopsis, 61 are found in this locality. Of the 503 genera, 214 are here distributed; and lastly, out of the 1500 estimated species, 406 are here found dispersed; thus, in this piece of ground which measures one mile and a half in length, and one mile in breadth, we have more than one half of the British natural orders, as 61 to 104, not quite half the genera, in the ratio of 214 to 503, and rather better than one-fourth the species, in the ratio of 406 to 1.500.

Mr Thomas Hancock then read a memoir "On the more interesting plants which he met with during an excursion with several gentlemen of the British Association as far as Penpool and Blaize Castle (about 8 or 10 miles N. W. of Bristol,) in the early part of September last. These papers having severally called forth some remarks, the meeting separated.

Jan. 19.—W. H. White. Esq. in the Chair. The names of the visitors introduced, and the minutes of the last meeting having been read and confirmed, members were proposed and elected. A continuation of Dr M'Intyre's paper on the plants found about Warley in Essex, having been read and discussed, the chairman stated, that the next meeting would take place on Feb. 2d, when a paper will be read by Joseph Freeman, Esq. "On the importance and practicality of adopting a more systematic method in describing and arranging the species of plants."

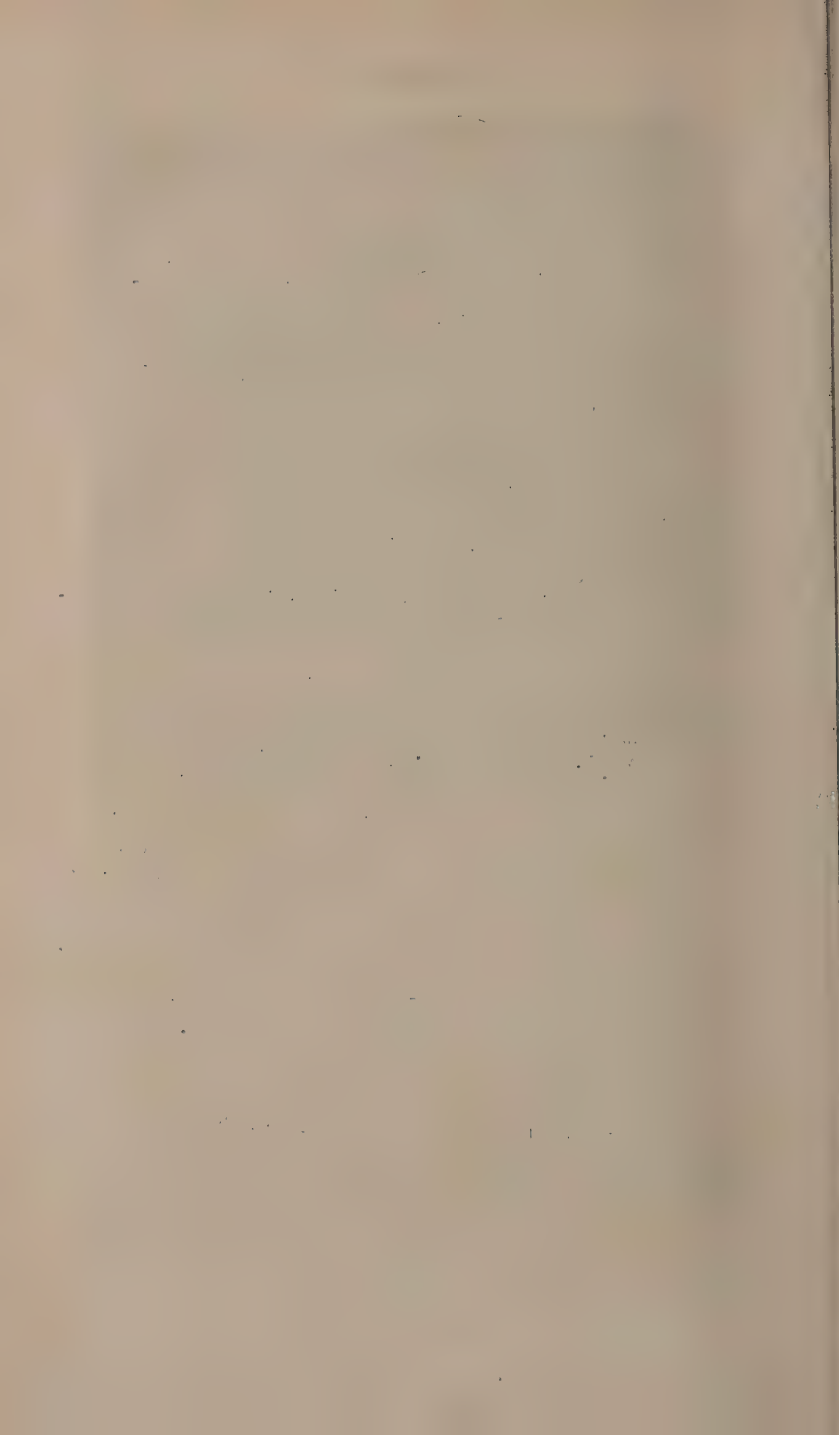
Feb. 2.—J. E. Gray, Esq. F. R. S. President in the Chair. Several presents &c. having been announced, and members proposed, and others elected, Mr Joseph Freeman read his paper on "Hints on the importance and practicality of adopting a more systematic method in describing and arranging the species of Plants," which produced much discussion and interest.

Mr G. E. Dennes then read some observations on the plants found about Deal, Walmer, Dover, and Sandwich, Kent, in August and September 1836. Thanks having been ordered to be returned to the above gentleman, the next meeting of the Society was announced for Thursday, Feb. 14 instant.

OBITUARY.

On the 24th January 1837, in Mill Street, Hanover Square, *Joseph Sabine*, Esq. the *Ornithologist*, F. R. S., F. L. S. &c. in his 67th year.

On the 19th December 1836, in Paris, *M. Persoon*, author of *Synopsis Plantarum*. His valuable Herbarium was sold to the French Government.



INDEX.

-
- | | |
|---|---|
| <p>'Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin,' analysis of, - 404-12</p> <p>Acacia lineata, - 287</p> <p>Adoxa, 296; Ad. moschatellina, the structure of its flowers, - 259</p> <p>Agaricus balininus, 509; cochleatus, 495; cossus, 508; cyphelliformis, 511; cinnamomeus 511; erubescens, 508; fusco-purpureus, 508; glaucopus, 43; hæmatophyllus, 507; mastoideus, 42; mitis, 511; pelianthinus, 42; pterigenus, 510; racemosus, 510; rubidus, 43; speciosus, 43; tuberosus, 509; vulgaris, 510; undatus, 509</p> <p>Alcyonella stagnorum, - 293</p> <p>Algæ, new British, - 297</p> <p>'Algæ Britannicæ,' Hooker's manual of, announced, - 201</p> <p>Alopecurus fulvus, 141; geniculatus, - 141</p> <p>America, North, zoology of, - 298</p> <p>Ammocetes branchialis, - 201</p> <p>Anatomy, comparative, its use to the zoologist, - 14-15</p> <p>Animals, estimate of their numbers, 3, 4</p> <p>Animal, huge marine, - 414</p> <p>'Annales des Sciences Naturelles,' analysis of, 101; 193; 290; 412; 486; 588</p> <p>Anodontes, - 487</p> <p>Antelope beisa, - 276</p> <p>Applegarth, Register of Thermometer kept at, - 506</p> <p>Aquila chrysaëtus, digestive organs of, - 129-134</p> <p>Aquila leucocephala, - 579</p> <p>'Archiv für Anatomie, Physiologie, und Wissenschaftliche Medicin,' analysis of, - 196; 292; 586</p> <p>Arvicolæ, - 493</p> <p>Ascidian Polypes, - 232</p> <p>Aspidium dumetorum, - 591</p> <p>Asplenium Felix Fæmina, - 591</p> <p>Astacus Europeus, - 175</p> <p>Asteroid Polypes, - 237</p> <p>Asteroma veronicæ, - 511</p> | <p>Athalia centifolia, - 485</p> <p>Ayrshire, contributions to its Flora, 498</p> <p>Babington, C. C., Botanical Notes, 136</p> <p>Baird, W., History of the British Entomostraca, 35-41; 309-333; 514-526</p> <p>Bee, its length of life, - 57</p> <p>Begonia Fischeri, 287; sanguinea, 287</p> <p>Belanger 'Voyage aux Indes Orientales,' reviewed, - 269</p> <p>Bell's 'History of British Quadrupeds,' noticed, - 280</p> <p>Belfast Natural History Society, 308</p> <p>Bennet, E. T., death of, - 308</p> <p>Berkeley, M. J., Notices of British Fungi, 42-49; 507-513</p> <p>Berkeley's, M. J., 'British Fungi,' noticed, - 401</p> <p>Berwickshire Naturalist's Club, 502</p> <p>Bevan, E., on the Honey-Bee community, - 57-62</p> <p>Birds, Digestive Organs of, 125-136</p> <p>Birds, Migratory in 1836, - 494</p> <p>Birds of Northern India, - 209</p> <p>Birds, British, Eyton's History of the rare species, noticed, - 400</p> <p>Bletia patula, - 287</p> <p>Blume's 'Rumphia,' noticed, 280</p> <p>Bog timber of Ireland, - 265</p> <p>Boisduval's 'Species Général des Lepidopteres' noticed, - 568</p> <p>Bonaparte, Luc., his 'Iconographia della Fauna Italica,' reviewed, 82-93</p> <p>Botany, requisites necessary for the advance of, - 113-125</p> <p>Botany British, works on - 107</p> <p>'Botanical Magazine,' Companion to the, noticed, - 289; 403</p> <p>Bowman on the longevity of the Yew, 301</p> <p>Brewster, Sir D., on the Crystalline Lenses of animals, - 206</p> <p>British Association, Meeting of at Bristol, - 297-306</p> <p>British Plants, Edinburgh Catalogue of, noticed, - 398</p> <p>British Plants, Henslow's Catalogue of, reviewed, - 393</p> |
|---|---|

- Briza*, nov. sp. f. - 140
Bufo calamita, - 234
Buprestis decipiens, - 253
Buteo vulgaris, digestive organs of, 134-6
Buzzard, digestive organs of, 134-6
Callitriche pedunculata, - 136
Calothrix distorta, - 296
Camel, fossil bones of, - 493
Cameleon cristatus, - 573
Canaries Isles, *Histoire Naturelle* des, noticed, 108; reviewed, 470
Caoutchouc, properties of, - 303
Carex Buxbaumii, - 107
Csrey, Rev. Dr., - 419
Carlisle Literary and Philosophical Society, - 111
Cercocebus, comparative anatomy of, 437
Cetonia aurata, - 294
Chalcites, - 437
Chara vulgaris, on the reproductive organs of, - 383; 592
Charadrius morinellus, - 104
Chelones, distribution of, - 198
Chili, *Leeches and Reptiles of*, - 414
Chionis, - 589
Chizarrhis zonurus, - 277
Chloromyia, 164; *Ch. flavicornis*, 165
formosa, 164; *polita*, - 165
Chrysopelea, 144; *Ch. Boiciei*, 144; *Capensis*, - 145
Chrysops, 453; *Ch. cæcutiens*, 454; *pictus*, 456; *relictus*, - 455
Cladotoma, 254; *Cl. ovalis*, - 255
Clavaria juncea, - 511
Clitellaria, 154; *Cl. ephippium*, 155
Closteries, Morren on the, - 488
Clupea alba, 50; 294; *Cl. sprattus*, 52; *harengus*, - 54
Coccothraustes vulgaris, - 448
Colobus guereza, - 276
Comparative Anatomy, its use in zoology, - 14, 15
Conops nigra, - 105
Cooper's, D., '*Flora Metropolitana*,' noticed, - 281
Coregonus pollan, - 247
Corythaix leucotis, - 277
Couch, J., on the exuviation of the common crab, - 341-4
Couch, J., on the exuviation of *Shrimps and Lobsters*, - 170-3
Crab, common, the exuviation of, 341
Crocus aureus, - 495
Crossbill, - 103
Crustacea, on their metamorphosis, 11, 12
Crustaceans, sexes of, - 492
Cuckoos, natural history of, 213-225; 430-7
Cuculidæ, natural history of, 213; 430
Cuculinae, - 430
Cuculus, - 436
Cunningham, Allan, - 496
Cunningham, R., his death, 109; 210
Curruca atricapilla, - 104
Cuvier's 'Hist. Nat. des Poissons', noticed, - 283
Cuvier, M. F., '*Hist. Nat. des Cétacées*, reviewed, - 174-187
Cyclops, 309; *Cy. castor*, 324; *cheilifer*, 328; *depressus*, 331; *furcatus*, 330; *minutus*, 326; *quadricornis*, 321; *stromii*, - 330
Cyclostomata, arrangement of, - 405
Cygnus Bewickii, - 462; 464
Cypris, 514; *C. detecta*, 525; *pubera*, - 524
Daubeny, Dr., on the action of Light upon Plants, and of Plants upon the atmosphere, - 205-6
Deccan, Fruits of the, - 303
Dickie, G., on the Reproductive organs of *Pilularia globulifera*, and the Globules of *Chara vulgaris*, 382
Distipsidera, 251; *D. undulata*, 252
D'Orbigny on the Raptores of S. America, - 347-359
D'Orbigny, Voyage dans l'Amérique Meridionale, noticed, - 108
Doubleday, H. on the *Hawfinch*, 448
Douglas, B. notice of, - 578
Drosera filiformis, - 267
Duclos' Monograph of the 'Oliva', noticed, - 108; 284
Dumeril, M. C. and Bibron's 'Erpetologie Generale', noticed, 285
Duncan, J., *Characters and Descriptions of the Dipterous Insects of Britain*, 145-167; 359-368; 453-6
Edinburgh Zoological Garden, 107
Ehrenberg on the Luminosity of the Sea, - 409
Elaphomyces granulatus, - 499
Enneapterygius, - 279
'Entomological Magazine', noticed, - 192; 288; 490; 576
Entomological Society, Proceedings of, - 109-10
Entomology of Edinburgh, additions to, - 494
Entomostraca, British, the History of, 35-41; 309-333; 514-526
Epacris microphylla, - 287
Erica Mackaiana, - 201
'Erpetologie Generale' by Dumeril and Bibron, noticed, - 285
Erythrophrys, - 436
Eschares, Edwards on the, - 588
Esenbeck, C. G. Nees ab, 'Hymen-

- opterorum Ichneumonibus affinium Monographiæ, noticed, 482
 Eudynamys, - - - 437
 Eyton, T. C., his History of rare British Birds, noticed, 400
 Eyton, T. C. on the Anatomy of the genus *Cercocebus*, - 437-9
 Falco rufipes, - - - 491
 'Fauna Japonica,' notice of, 205
 Fauna, Local, importance of, 421
 Ferns, on the Germination of, 333-441
 Ferns, Structure of, - 412
 Férussac, Baron de, his death, 112
 Festuca durinacula, - 141
 Fishes British, Yartell's History of, reviewed, - 384
 Flora of Ayrshire, contributions to, 498
 'Flora, The British,' reviewed, 93-8
 'Flora, The English,' reviewed, 93-8
 'Flora, Hibernica,' reviewed, 262
 Flora, Local, on the construction of, - 424, 430
 'Flora Metropolitana,' noticed, 281
 'Flora The Northern,' reviewed, 396
 Flustræ, the ova of, - 246
 Forbes, E. on the Testacea of the Alps, - - 257-9
 Fungi, British, notices of, 42-9 : 507-13
 Galloway, Botany of, - 295
 Gasterosteus semiarmatus, - 201
 Gazza, - - - 279
 Geotrupes lethroides - - 256
 Golden Eagle, digestive organs of, - 129-134
 Gould's 'Synopsis of the Birds of Australia,' noticed, - 571
 Gould's Birds of Europe, - 572
 Gould's 'History of Birds,' announced, - 108
 Gould, J., on the genus *Paradoxornis*, - - 62-4
 Gould's Monograph of the Rhamphastidæ reviewed, - 187, 192
 Graham's, Prof., Botanical Excursion to Galloway, - 295
 Grant on the Ova of Flustræ, 246
 Greville, R. K. on the Entomology of Edinburgh, - 494
 Haliochærus griseus, - 302
 Hawfinch, Notes on the, 448
 Hæmatopota, 457. H. pluvialis, 457
 Helianthoid Polypes, - 239
 Helix algira, 486; scarburgensis, 201
 Helvella elastica, - 418
 Henderson, J. on the germination of Ferns, - - 333-341
 Henslow, J. S., on the disunion of contiguous Layers in the wood of Exogenous Trees, 32; on the requisites for the advance of Botany, 113; on the Flower of *Adoxa moschatellina*, 259; on two new species of *Opuntia*, with remarks on the fruit of *Rhipsalis*, - 466
 Henslow's Catalogue of British Plants, reviewed, - 393
 Herbarium Willdenowian, - 417
 'Herpetologia Mexicana,' noticed, 401
 Herring, The, - - 54
 Herring, Garvie, - - 52
 Hersilia, - - - 491
 Hieracium, nov. sp. ? - 137
 Hipparchia blandina, - 105; 491
 Histiothorus immaculatus, - 485
 Honey-Bee, - - - 57
 Hooker, Sir W. J. his 'British Flora,' noticed, 93; his 'Icones Plantarum,' 418; his 'Companion to the Botanical Magazine,' 289; 403; 578
 Hyboma carinata, - - 256
 Hybrids between the Grouse and Pheasant, - - 450
 Hydra viridis, - - 236
 Hydraform Polypes, - 235
 Hygrophila, - - 265
 Hypericum, - - 489
 Ichthyology, British, Contributions to, - 526-8
 Ichthyology of the Firth of Forth, 50-57; 344-7
 'Iconographia della Fauna Italica,' reviewed, - 82-93
 Ilex Paraguayensis, - 207
 'Indes Orientales, voyage aux,' reviewed, - 269
 Insects, Dipterous, of Britain, 145-167; 359-368; 453-9
 Ireland, Contributions to the Nat. History of, - 459
 Isaria brachiata, 49; citrina, - 49
 Jameson on the Birds of Northern India, - - 209
 Jardine, Sir W., and P. J. Selby's 'Illustrations of Ornithology,' noticed, - 573
 Jenyns, L. on the study and present state of Zoology, - 1-31
 Johnston, G., History of British Zoophytes, 64-81; 225-247; 440-8; Miscellanea Zoologica, 368-382; 529, 538
 'Journal, American, of Sciences and Arts,' noticed, - 102
 'Journal, the Edinburgh New Philosophical,' analysis of, 99; 286; 402; 574

- Jungermannia Mackaii, 296; pusilla, 592; Woodsii, 107
 Jussieu, his death, 419
 Labrus rupestris, 170
 Larus minutus, 491; Sabinii, 460, 464
 Larvæ, parasitic, 295
 Lea, J. 'on the genus Unio,' noticed, 284
 Leach, Dr, his death, 419
 Leathes, G. R., his death, 112
 Leeches of Chili, 414
 Leontodon taraxacum, 138
 Leucojum æstivum, 499
 Lichens, new British, 297
 Link on the structure of Ferns, 412
 Linnæan Society, Transactions of, noticed, 573
 'Linnea,' analysis of, 587
 Lobster, on the Exuviation of, 170-3
 Loxia curvirostra, 103
 Lucanus camelus, 302
 Luminosity of the Sea, 409-12; Lutjanus rupestris, 167
 Macgillivray, W., on the Digestive Organs of Birds, 125
 Machilis polypoda, 488
 Mackay, J. T. 'Flora Hibernica,' reviewed, 262
 Macquart's 'Dipteres,' noticed, 567
 Macrorampus griseus, 104
 'Magazine of Natural History,' analysis of, 100; 287; 402; 489; 575
 Mangel Wurtzel, 301
 Marsiliaceæ, 496
 Medico-Botanical Society, 110; 207; 306; 500; 592
 Melancomium bicolor, 49
 Monochirus minutus, 527
 Moscow, Memoires de la Soc. Imp. des Naturalistes de, noticed, 583
 —Bulletin de la Soc. 584
 Mosses, new British, 296
 Motacilla neglecta, 200, 491
 Murray, A. his 'Northern Flora,' reviewed, 396
 Myxinoideæ, the anatomy of, 404-9
 Nemertes, 529; N. gracilis, 534; lactiflorea, 534; melanocephala, 535; oculolata, 537; olivacea, 536; pulchra, 535; purpurea, 537; quadrioculata, 535; rufifrons, 537
 Nemotelus, 158; N. brevirostris, 160; nigrinus, 159; pantherinus, 159; uliginosus, 158
 Neritina fluviatilis, 201
 Newcastle-upon-Tyne, state of Nat. Hist. in, 203
 Noctuadæ, Northumbrian, 415
 Nymphon, 376; N. femoratum, 380; gracile, 380
 Odontomyia, 151; O. argentata, 152; felina, 153; hydroleon, 153; hydropota, 153; ornata, 152; tigrina, 154; viridula, 154
 Opuntia Darwinii, 466; galapageia, 467
 Orichya, 376; O. coccinea, 378
 'Ornithologist's Text Book,' noticed, 281
 Oxycera, 155; O. analis, 158; formosa, 157; muscaria, 157; pulchella, 156; terminata, 157; trilineata, 156
 Oxylophus, 436
 Pachygaster, 166; P. ater, 166; Leachii, 167
 Palæmon serratus, 171
 Pallene, 376; brevirostris, 380
 Paludinæ, 201
 Paradoxornis, 63; flavirostris, 64
 Parmacella, 492
 Parnell, R. on the Ichthyology of the Firth of Forth, 50-7; 344-7; Contributions to British Ichthyology, 526-8
 Parr, The, notice of, 287
 Peat, formation of, 305
 Perdix melanocephala, 278; Erckellii, 278
 'Perroquets, Collection de,' by St Hilare, announced, 282
 Persoon, M. death of, 595
 Peziza fusarioides, 46; rosæ, 46; sanguinea, 46
 Phascidium coronatum, 513
 Phœnicura tithys, 104
 'Philosophia Botanica,' announced, 417
 Phlebia vaga, 511
 Phoca vitulina, 103
 Phocæ, the habits of, 539
 Phoxichilus, 376; spinosus, 377
 Physarum metallicum, 49
 Physis furcatus, 104
 Pilularia globulifera, 306; 591; on the reproductive organs of, 382; 497
 Pleurotuchus, 142; 491. Pl. Desjardinii, 143; typicus, 143
 Poinsettia, 99
 'Poissons, Histoire Naturelle des,' noticed, 283
 Polan, The, 247
 Polyangium vitellinum, 47
 Polypes, structure of, 246
 Polypidoms, formation and structure of, 440
 Polypodium calcareum, 141
 Polyporus cinctus, 43
 Pristurus, 279

- Pritchard, Dr. on Species, 305
 Pseudochromis, 279
 Psiloma arundinis, 49
 Pteropus Whiteii, 485
 Ptilonorhynchus albirostris, 277
 Pycnogonidæ, British, 368-375
 Pycnogonum, 376; littorale, 376
 Pyronema marianum, 45
 Quadrupeds, British, Bell's History of, noticed, 280
 Questions de l'Academie Royale des Sciences de Berlin pour 1837 et 1839, 202
 Raniceps trifurcatus, 104; 201; 344
 Raptore of S. America, 347-359
 Raspail on the structure of Polypes, 246
 Regulus ignicapillus, 491
 Reptiles of Chili, 414
 Reptiles, South African, two new genera of, 141-5
 Rhipsalis, on the structure of the fruit of, 469
 Richardson, Dr. on the Zoology of N. America, 298
 Rossmæssler's 'Forstinsecten,' noticed, 483
 Royal Society, Edinburgh, Proceedings of, 110
 Royle on the properties of Caoutchouc, 303
 Rubus, 296
 'Rumphia,' by Blume, noticed, 280
 Ruppel, Ed. 109
 Ruppel's 'Neue Wirbelthiere,' reviewed, 275
 Rusconi on the ova of Fish, 586
 Sabine, J. his death, 595
 Salmon, food of, 300
 Sargus, 160; cuprarius, 161; flavipes, 162. infuscatus, 162; nitidus, 162; Reaumuri, 163
 Sceptranthes, 99
 Sclerotium cornicola, 511; medullare, 47; truncorum, 511
 Scolopax major, 415
 Seal, habits of, 103, 539
 Selby, P. J. on the Lutjanus rufepetris of Bloch, 167-170; on the importance of a Local Fauna, 421-4
 Shrimps, the Exuviation of, 170-3
 Siebold's 'Fauna Japonica,' noticed, 205
 Silene otites, 495
 Sitta europæa, 103
 Smith, Dr. 109; his characters of two new genera of S. African Reptiles, 141-5
 Smith, Sir J. E. his 'English Flora' reviewed, 93
 Society, Belfast, Nat. History, 308
 Society, Botanical, of Edinb. 106; 416
 Society, Botanical, of London, 415; 500-92
 Society, Medico-Botanical, 207, 306, 500
 Society, Royal, 205
 Society, Royal of Edinburgh, 208
 Society, Shropshire and North Wales
 Natural History and Antiquarian, 210
 Society, Tweedside Physical and Antiquarian, 307; 504
 Spartina glabra, 499
 Sparus auratus, 294
 Sphæria angelicæ, 48; arundinis, 48; decedens, 47; detrusa, 47; favacea, 47; herpotricha, 48; hypoderma, 47; microstoma, 47; pantherina, 47; rubiginosa, 47; sanguinea, 48; velata, 47; xanthostroma, 47
 Sphæronema blepharistoma, 512
 Spirantes autumnalis, 499
 Spirula Peronii, 414
 Sprat, the, 52
 Sterna stolidæ, 459
 Stilbospora angustata, 49
 Stilbum anomalum, 49; piliforme, 49
 49; rigidum, 49
 Stratiomydæ, 146
 Stratiomys, 146; S. chamæleon, 148; furcata, 150; potamida, 149; riparia, 150; strigata, 151
 Swainson, W. on the natural history and Relations of the Cuckoos, 213, 225, 430-7
 Swainson's Natural Histories in 'Lardner's Cyclopædia' reviewed, 545-566
 Sykes, Col., on the fruits of the Decan, 303; On the Quails and Hemipodii of India, 484
 Syncesia, 266
 Tabanidæ, 359
 Tabanus, 360; T. autumnalis, 363; bovinus, 362; bromius, 365; fulvus, 368; luridus, 366; montanus, 365; micans, 363; rusticus, 367; solstitialis, 366; tarindinus, 364; tropicus, 367; vittatus, 364
 Tadpole Fish, 344
 Taraxacum dens-leonis, 137
 Tea, 195
 Tea, Paraguay, 207
 Teale on Alcyonella stagnorum, 293
 Temminck 'Monographies et Recueil de Planches coloriées,' noticed, 108
 Testacea of the Alps, 257

Thelephora arida, 45; puteana, 44; spadicea, ...	511	White bait, ...	50
Thompson, W. on Hybrids, 450; contributions to the Nat. History of Ireland, 459:—on the Polan of Loch Neagh, ...	247	Wiegmann's 'Herpetologie Mexicana,' noticed, ...	401
Tozer, J. his death, ...	112	Willdenowian Herbarium, ...	417
Trees, exogenous, the structure of, 32-5		Wilson, J. on the Habits of the Scotch Phocæ or Seals, ...	539
Tremella foliacea, ...	46	Wood's, N., 'British Song Birds,' noticed, ...	282
Trigla cuculus, 403; Lucerna, ...	526	Wood's, N., 'Ornithologist's Text-Book,' noticed, ...	281
Tringa pectoralis, ...	200	Woodcock, ...	201
Twizel, Fauna of, ...	421-4	Xenoden, ...	279
'Unio,' Lea on the genus, noticed, ...	284	Yarrell, W., 'History of British Fishes,' reviewed, 384; on an Insect destructive to Turnips, ...	485
Upupa epops, ...	491	Yew-tree, Longevity of, ...	301
Valenciennes' 'Histoire Naturelle des Poissons,' noticed, ...	283	Zoology, Remarks on the Study of, 1	
Vitrina pellucida, ...	258	—— on its present state, ...	31
Watson, H. C. on the construction of a Local Flora, ...	424	—— of North America, ...	298
Webb, P. Barker, et Sabin Berthelot's 'Histoire Naturelle des Iles Canaries,' reviewed, ...	470	Zoological Garden in Edinburgh, ...	107
Wernerian Society, proceedings of, 110; 209		Zoological Society of London, the 'Transactions' of, noticed, ...	484
Westwood, J. O. Descriptions of Exotic Coleoptera, ...	251-7	Zoophytes, British, the History of, 64-81; 225-247; 440-8—Their orders defined, ...	484

ERRATA.

Page 167, line 29, for southern, read northern.
 — 168, — 4, for Barncleugh, read Bamburgh.
 — 169, — 10, for first, read for it.
 — 200, — 21, for Stoke-Maryland, read Stoke-Nayland.
 — 200, — 26, for Mr Anderson, read Mr Audubon.
 — 250, — 13, for 61500, read 6150.
 — 289, — 10, for Thuckard, read Shuckard.
 Plate VIII ought to be Plate IX.
 — IX ————— VIII.
 For Plate XII, at page 376 et seq., read Plate XIII.

EDINBURGH:

PRINTED BY JOHN STARK, OLD ASSEMBLY CLOSE.

PLATE I.

Fig 1



Whitebait.

Fig 2



Sprat

Fig 3



Herring.

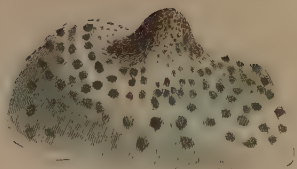


Fig 1.

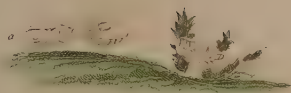
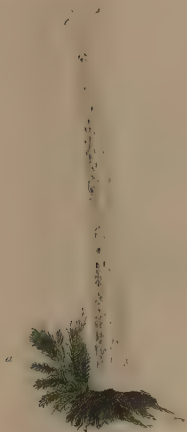


Fig 2.



Fig 3.

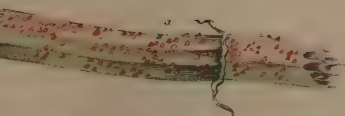
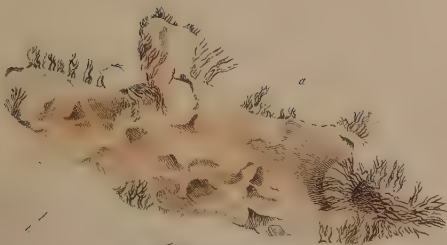
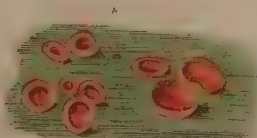
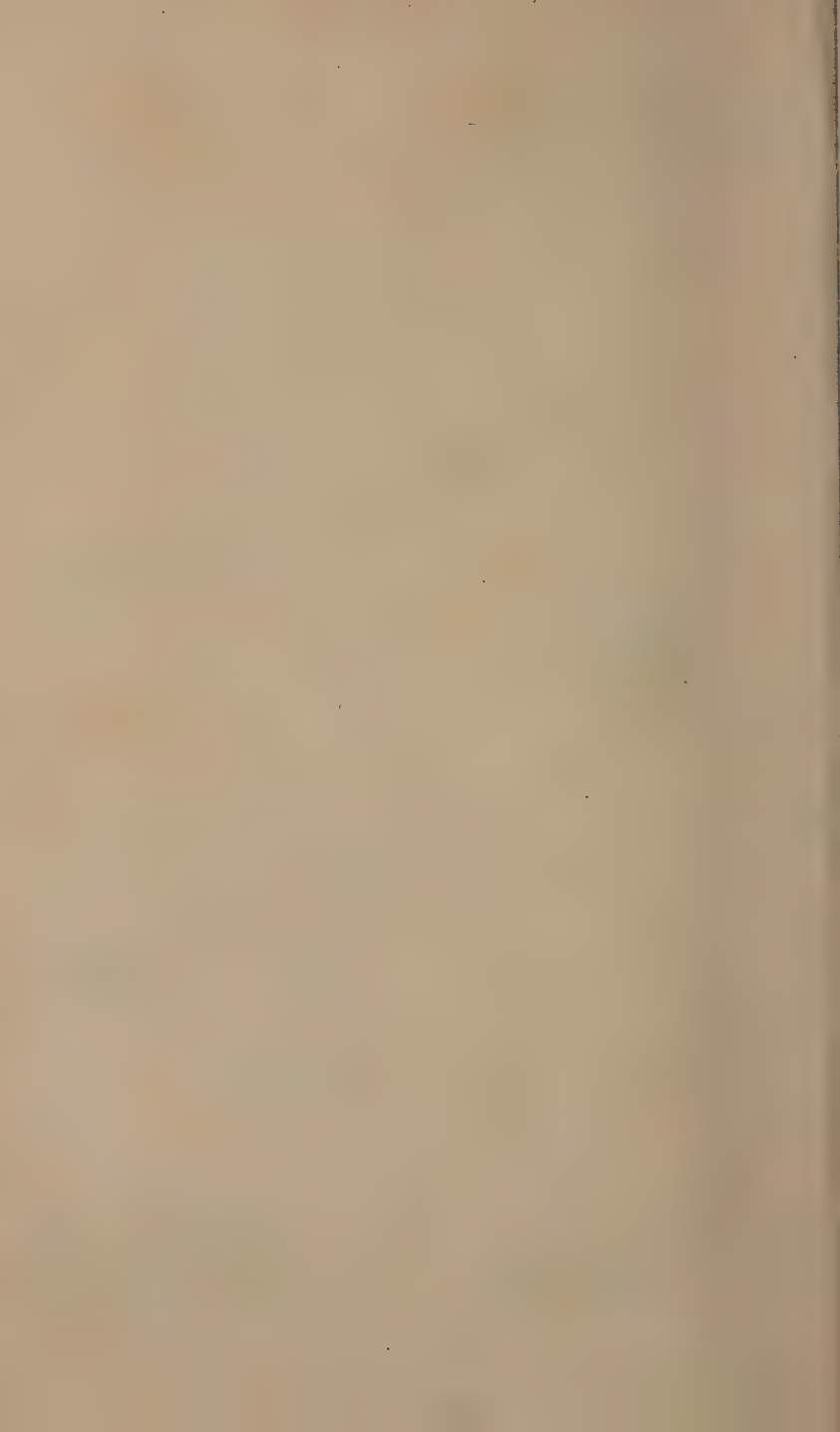


Fig 4.





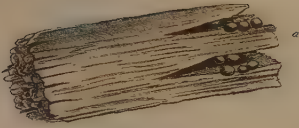
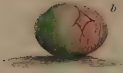


Fig. 6



Fig. 7



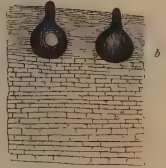
b



c



c



b



a

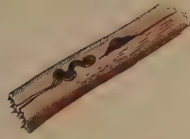


Fig. 13



b



c



b



d



e



f



Fig. 20



c



Fig. 22



b

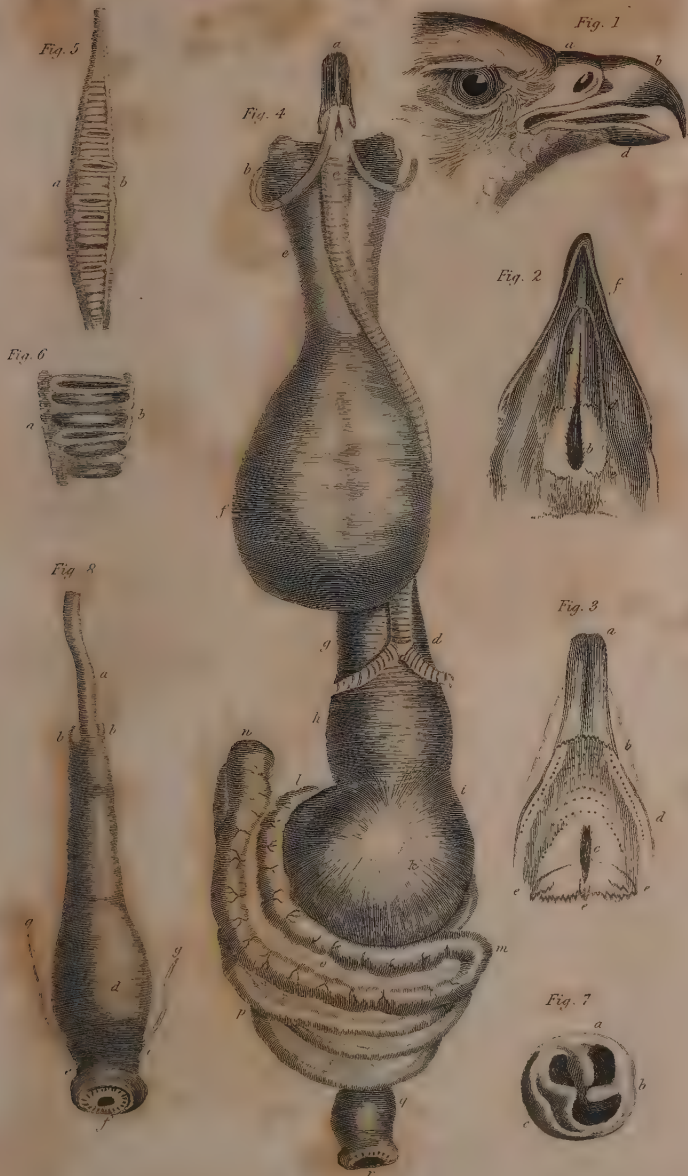


b



c









Zool. & Bot. Mag.

W Mac Gillivray Delt





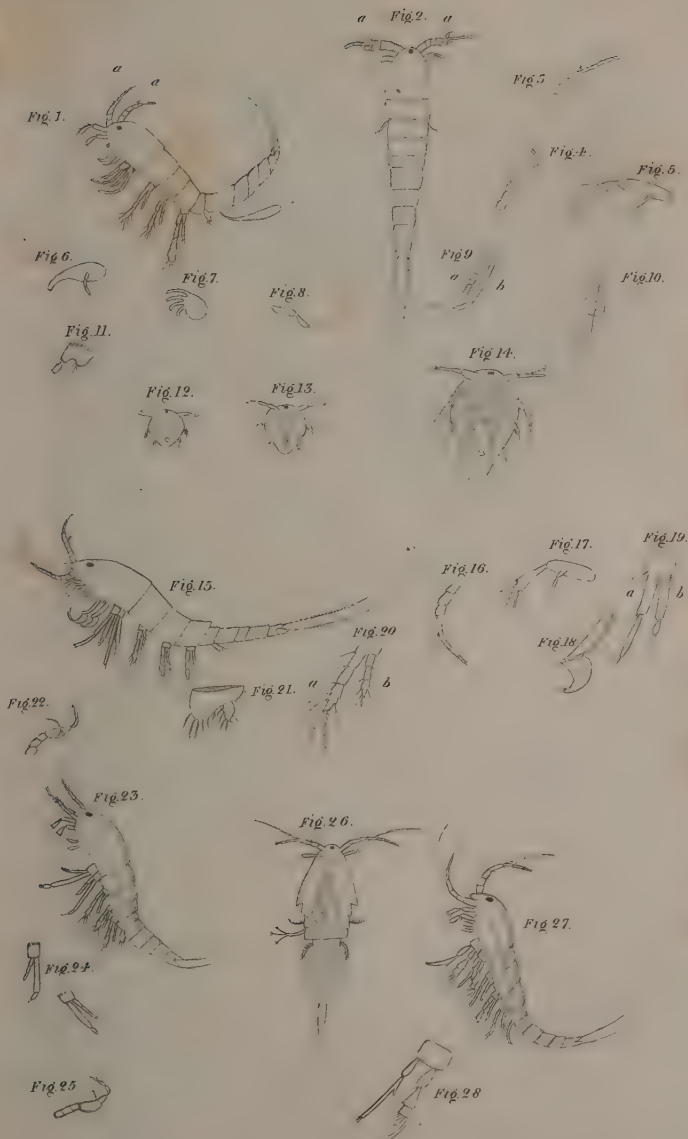
Crenulabrus rupestris.

Zool. & Bot. Mag.

P. J. Selby del.

L. 1848. 10





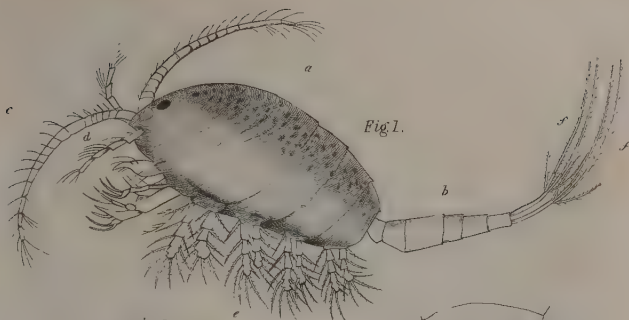


Fig. 1.

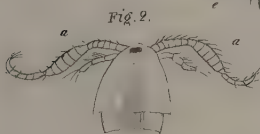


Fig. 2.

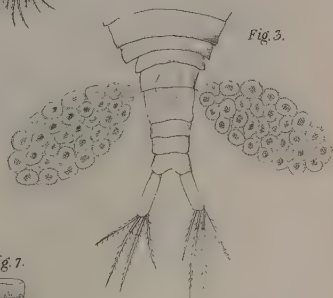


Fig. 3.

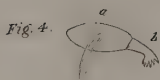


Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.



Fig. 10.

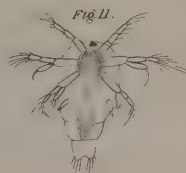


Fig. 11.

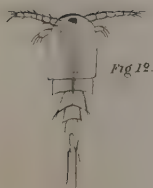


Fig. 12.



Fig. 13.

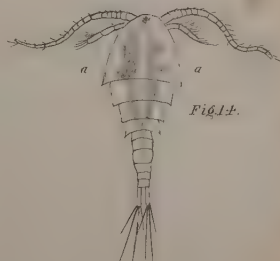


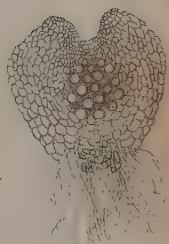
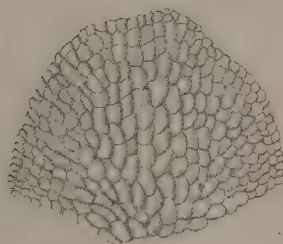
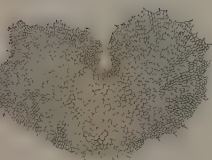
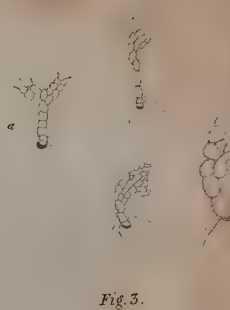
Fig. 14.



British Entomostraca.

H. T. S. 1860





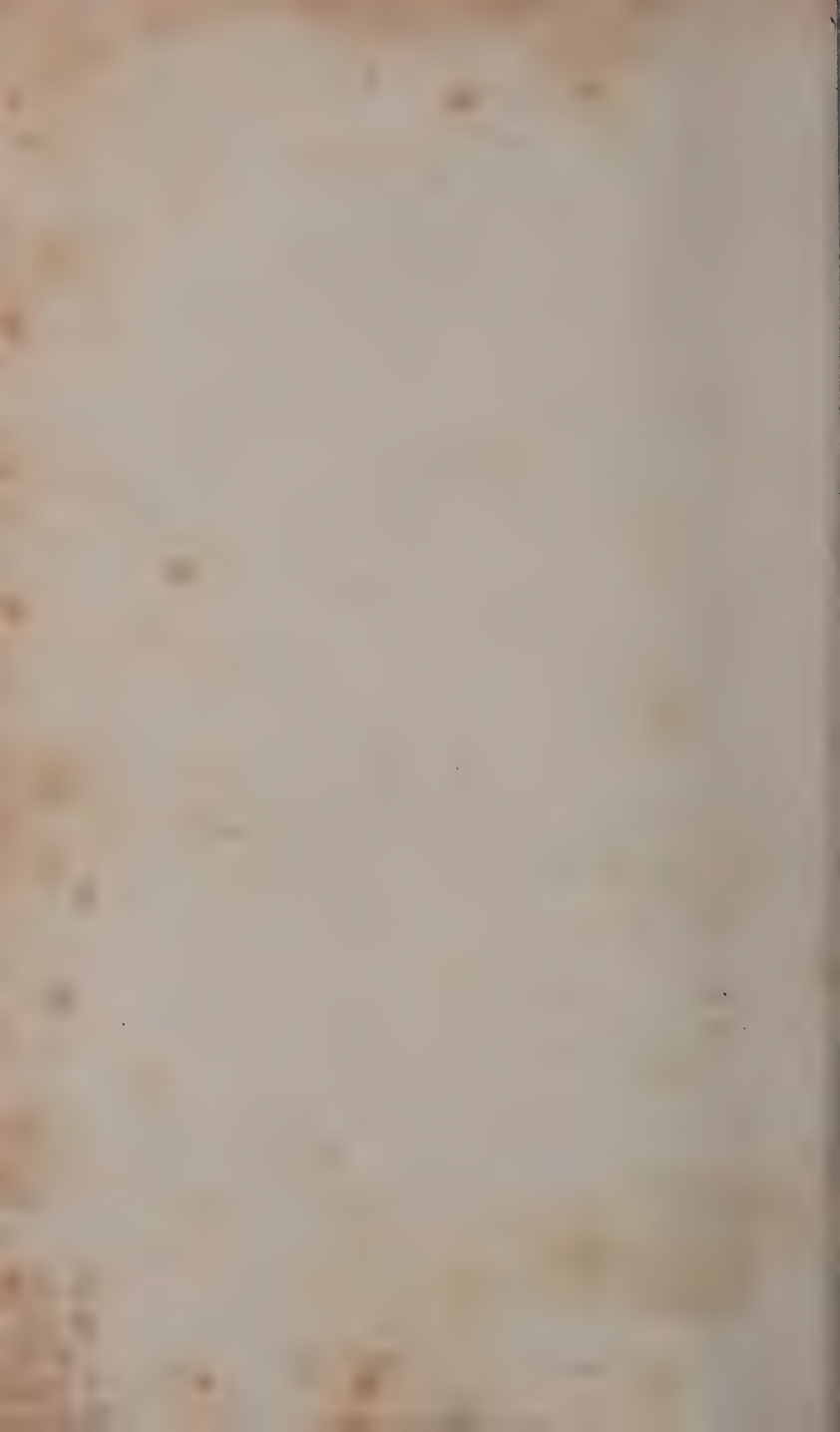




Fig. 13.



Fig. 14.

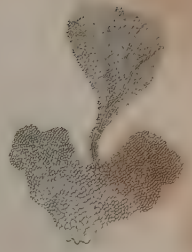


Fig. 15.



Fig. 16.



Fig. 17.



Fig. 18.



Fig. 19.



Fig. 20.



Fig. 21.



Fig. 22.

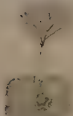


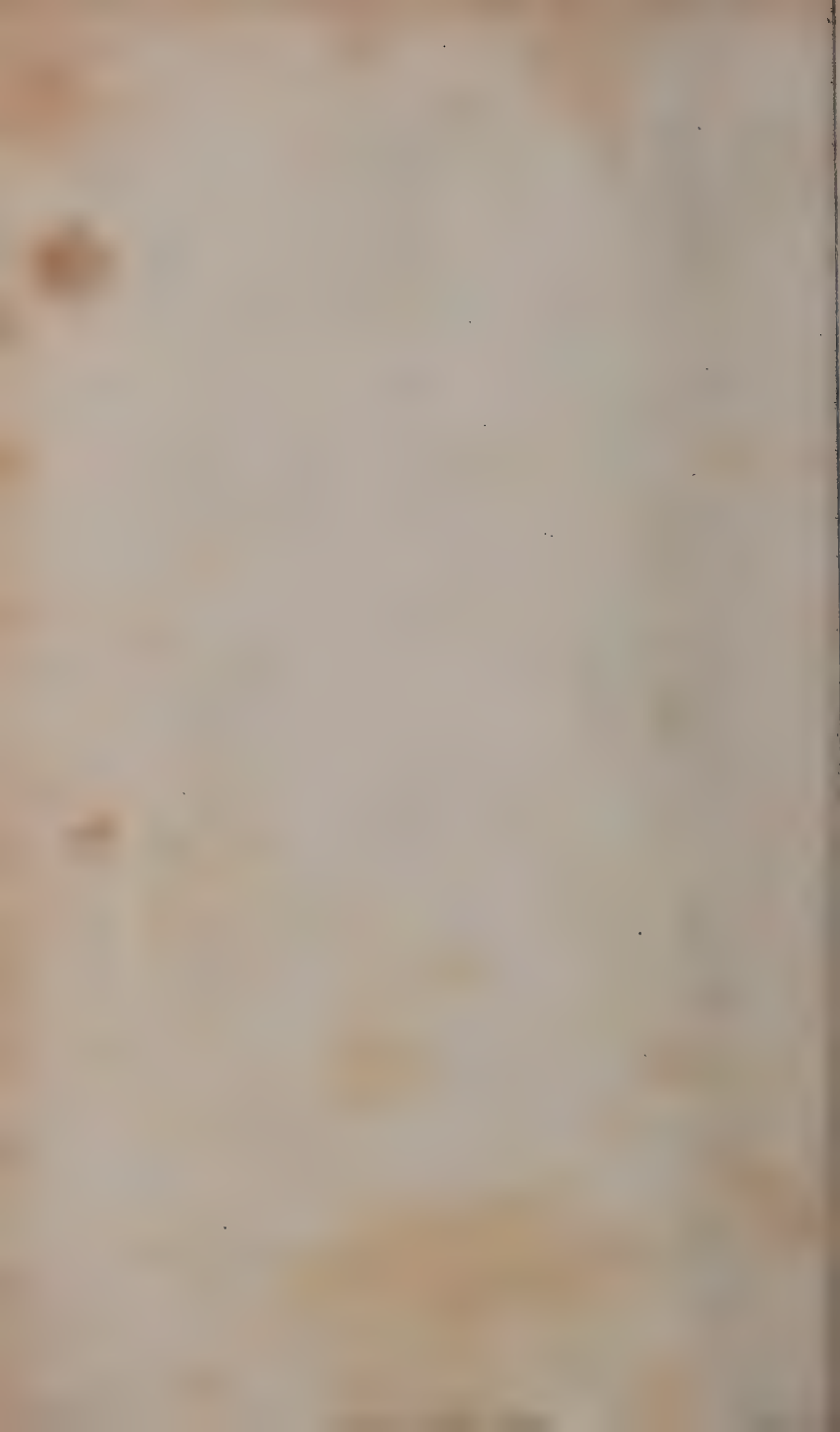
Fig. 23.

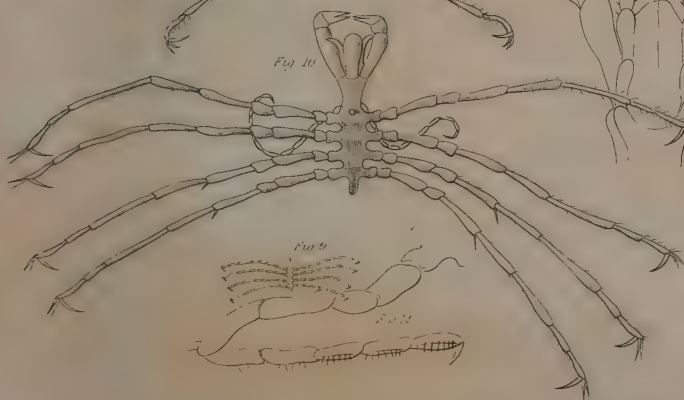
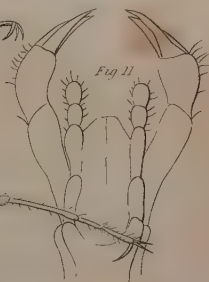
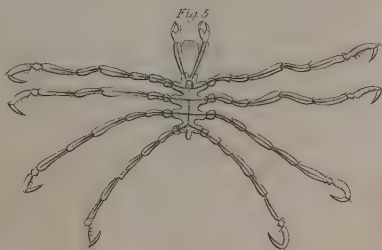
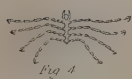
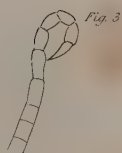
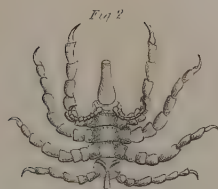
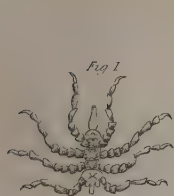


Fig. 24.



Fig. 25.







O. darwinii

Fig. 1.

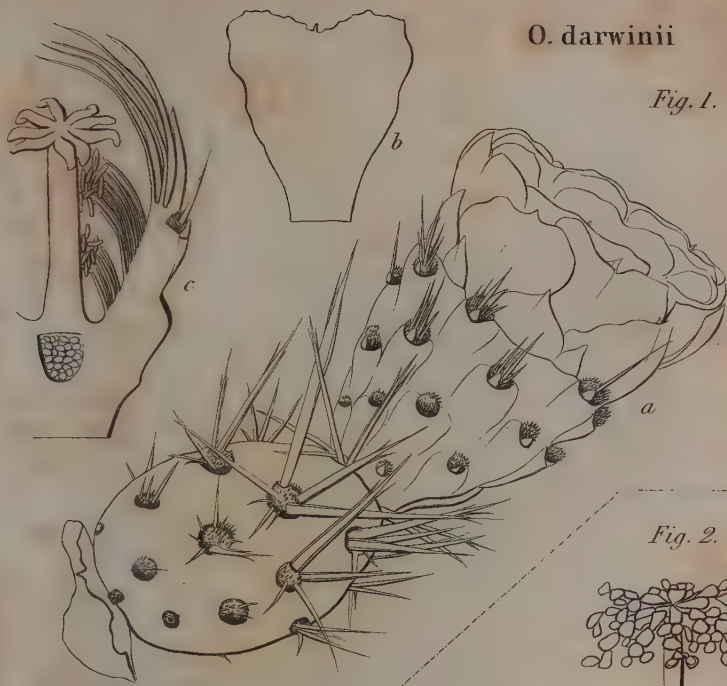


Fig. 2.

*O. galapageia*



PLATE I *



Raniceps trifyracatus.
Tadpole fish.



